THE

LONDON DISPENSATORY:

A Practical Synopsis

OF

MATERIA MEDICA, PHARMACY, AND THERAPEUTICS:

ILLUSTRATED WITH MANY USEFUL TABLES, AND WOODCUTS OF THE PHARMACEUTICAL APPARATUS.

BY THE LATE

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ELEVENTH EDITION.

EDITED

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LONDON:
LONGMAN, BROWN, GREEN, AND LONGMANS.
1852.

LONDON:
SPOTTISWOODES and SHAW,
New-Street-Square.

TO

SIR JAMES MACGREGOR, BART.

M.D. F.R.S.

FELLOW OF THE ROYAL COLLEGES OF PHYSICIANS

OF LONDON AND EDINBURGH;

AND

DIRECTOR GENERAL OF THE ARMY MEDICAL DEPARTMENT,

&c. &c. &c.

AS

A TESTIMONY OF RESPECT AND ADMIRATION

FOR HIS ARDUOUS AND WELL DIRECTED EFFORTS TO PROMOTE

THE CULTIVATION OF GENERAL SCIENCE

IN THE PUBLIC DEPARTMENT UNDER HIS CONTROL;

AND, CONSEQUENTLY,

TO ELEVATE THE CHARACTER OF THE MEDICAL PROFESSION,

THIS VOLUME IS INSCRIBED,

BY HIS FRIEND,

THE AUTHOR.

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EDITOR'S PREFACE.

HAVING been requested to bring out a new edition of the London Dispensatory, the Editor the more willingly accepted the task from having enjoyed, during several years, the friendship of the late Author, both as a pupil in his class at University College, and afterwards as his colleague at University College Hospital. The issue of new editions of the Phamacopœias by the London and Dublin Colleges, since the death of the Author, has rendered it necessary to revise the Dispensatory, in order to embrace the alterations contained in them; in doing which the Editor considers it incumbent upon him to enter a little into detail respecting the changes he has made. That the present work has been highly appreciated by the Medical Profession, and those engaged in the dispensing of medicines, is rendered evident by the numerous editions through which it has passed, the reputation it has enjoyed, and the confidence with which appeal always has been made to it. It has therefore been the great aim of the Editor in this edition to preserve as much as possible the matter of the Author, and only to make such alterations as the changes in the Pharmacopœias and the progress of Science have rendered necessary. In order to accomplish this, the arrangement of the work has been preserved with a few unimportant exceptions, consisting of the removal of an Appendix, formerly attached to Part I., and making it a portion of the General Appendix. Part I. will be found considerably reduced in extent, but it is believed that the diminution is not due to the removal of any important matter. In the various editions through which the work had passed, much material had gradually accumulated, which the Editor considered might be advantageously removed, consisting of spe-

culative discussions on the constitution of matter and other subjects, which, although valuable at the time of its appearance, have now ceased to be so; all that is essential has been embodied in Parts II. and III., or added to the Appendix.

In Part II. the important alterations are as follows:—In the first place, any new drugs contained in the lists of Materia Medica in the new Pharmacopœias have been added. A few of the drugs not now officinal, and which have fallen into disuse, have been omitted. Again, certain articles have been introduced which, though not officinal, have recently gained considerable reputation as remedies. Little or no alteration has been made in the Botanical description or history of the drugs, except where change of name has rendered such necessary. The descriptions of these by the Author have long been considered as constituting one of the most valuable portions of the work, and have been freely made use of by various compilers of Dispensatories. In describing the composition of the various articles in the Materia Medica, such additions and alterations have been made as the progress of Chemistry have rendered essential, at the same time the whole has been simplified by the omission of matters and discussions which have now ceased to be of interest. In the treatment of the medical properties and uses of drugs but little alteration will be found, little progress or change of opinion having taken place since the last edition was issued, and the Editor did not consider himself called upon to give his own opinions, even when differing from those of the Author, it being his aim that the present edition should be strictly a work of Dr. Thomson, and not one representing the Editor's opinions on the subject of Therapeutics. The character of the work likewise, which does not profess to enter into much therapeutical detail, prohibits the introduction of all controversial discussions on the actions of medicines. The arrangement in Part II. is alphabetical. When a drug is described which is not made officinal, then no prefix is attached. When such is contained in the lists of the Materia Medica of all the British Colleges, then the prefixes, Lond. Edin. Dub., are attached to the name before the description. When, however, as is frequently the case, a drug is contained in the list of Materia Medica of one College, and among the preparations of

another, then the prefix of the College in whose list it appears is attached to the name, and the reader is referred to the same article among the preparations in Part III., where, under the same head, the other prefixes will be found, indicating that it is not only made officinal by these latter Colleges, but processes for the preparation have likewise been given by them, which are there inserted.

In Part III., which contains all the officinal preparations of the London, Edinburgh, and Dublin Colleges, the greatest alterations have been made, rendered necessary by the appearance of the new Pharmacopœias. As the value of a Dispensatory, both to the medical practitioner and also to the dispenser, depends upon its accuracy, the Editor has spared no pains to render this part of the work correct, so that it may be appealed to with confidence; and although aware of the great difficulty existing, on account of the discrepancies in names, compositions, &c. of various preparations in the three Pharmacopœias, he trusts he will not be found to have fallen far short in effecting his object. The alterations in the Appendix chiefly consist in the addition of a short article on Electricity and a collection of tables, many of them derived from Part I. in former editions. In conclusion, the Editor hopes that the present edition of the London Dispensatory will not be found unworthy of that confidence which, for so many years, has been bestowed upon its predecessors.

63. *Harley Street,*
May, 1852.

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THE

LONDON DISPENSATORY.

PART I.

ELEMENTS OF PHARMACY.

PHARMACY is that branch of the science of chemistry which relates to the combination and mixture of different substances, for the purposes of medicine.

Its practice presupposes a knowledge of the ultimate principles of the substances employed in its operations, and of their chemical agencies; hence, of the general doctrines of Chemical Science. The elements, therefore, of Pharmacy, properly speaking, are those of Chemistry; and without a knowledge of these, Pharmacy can neither be theoretically understood, nor advantageously practised as an art.

As, however, it would be impossible in this place to give more than an outline or epitome of the elements of Chemistry; and as the second part of this work is intended to contain the analysis as well as the history and an account of the uses of the different articles of the Materia Medica which constitute the subjects of Pharmacy, I shall confine the term Elements of Pharmacy to comprehend those general principles of chemical action which enable us to reason on and perceive the proximate causes of the results of pharmaceutical combinations; and to the explanations of the operations of Pharmacy, with a description of the apparatus.

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SECTION I.

THE agents which more generally influence chemical, and, hence, pharmaceutical combinations, are *Attraction and Repulsion.*

I. ATTRACTION.

ATTRACTION is the term employed to denote that power which causes bodies to approach towards each other, and which preserves them in a state of union after they come into contact. We are ignorant of the cause of this power, but some of the laws respecting it are sufficiently evident; and, from observing the different phenomena to which these give rise, we are inclined to believe that there are different species of attractions, although, perhaps, the difference is more in degree than in kind.

When this power is exerted on masses of matter, at sensible distances, in the direct ratio of the quantity of the matter, and the inverse ratio of the square of the distance, it is named *Gravitation;* but when its operation is confined to the minute atoms of

bodies, and is exerted only when these are near to each other, or in apparent contact, it is denominated *Contiguous Attraction*, or *Molecular Force.* The former causes bodies on this globe to fall in a line perpendicular to its surface, preserves the planets in their orbits, and sustains in their places all the parts of the magnificent frame of the Universe : the second is the cause of the regular figures of natural bodies, and of the various combinations of matter which take place in and upon the surface of our globe. It is this species which we are here to examine.

CONTIGUOUS ATTRACTION, operating on particles of the same kind, forms an aggregate or mass ; and the power, in this instance, is named the *attraction of aggregation*, *homogeneous attraction*, or *cohesion ;* but, acting on dissimilar particles, and producing bodies possessed of new properties, different from those of their components, it constitutes *chemical attraction*, or *affinity.*

a. OF COHESION.

The attraction of *Cohesion* is that force which holds together the particles of bodies at insensible distances. According to the degree of force which it exerts, substances assume the solid, the fluid, or the aëriform state.

1. In *solid* bodies this force is sufficiently powerful to prevent their component particles from being moved with regard to one another, except in a very small degree ; and to oppose a considerable resistance to any mechanical power applied to separate them. In the same kinds of bodies, all the circumstances being equal, it is always the same; but in dissimilar bodies it is exceedingly various: from which, and the peculiar arrangement of the particles, arise the different qualities of solids, denominated hardness, softness, brittleness, malleability, ductility, elasticity, and compressibility.

The attraction of cohesion in solids is exerted at insensible distances only, and may be weakened, or altogether overcome, by an antagonist homogeneous power, namely, *Caloric*, or heat. If a piece of ice, for example, be brought near a fire, the cohesion of its particles is weakened as the caloric flows into it, till it is changed from the solid to the fluid state, or water ; and by continuing and increasing the heat, the particles are still further repelled or separated from one another, until the fluid passes into the gaseous form, or becomes steam.

There is a power of cohesion, which combines heterogeneous bodies, and is named *heterogeneous* attraction, the highest degree of which constitutes *chemical affinity.* When a solid body is put into a fluid, the affinity between the particles of the fluid and those of the solid is often sufficient to overcome the aggregation of the solid ; and its detached particles, being uniformly diffused through the fluid, now form a part of it, without altering, or greatly alter-

ing, either its fluidity or its transparency. This constitutes the ordinary chemical or pharmaceutical process of *solution,* which is always favoured by pulverization ; and by the application of heat, owing to the assistance which Caloric affords in overcoming the cohesive attraction, as has been already noticed.

2. In *liquid* bodies cohesion also operates, but in a less degree than in solids, their particles being at greater relative distances, and moveable with regard to each other by a very small force; but as their mobility does not change their relative distances, they remain within the sphere of this attraction, and are kept together. The exertion of this power varies in different liquids : it is greater in mercury than in water, and in water greater than in alcohol. It offers, however, scarcely any resistance to the combination of fluids with other bodies; and, hence, the mutual affinity of two bodies is always favoured when one of them is in the liquid form. Between bodies that do not combine when they are mixed in a liquid state, there is little or no affinity.

3. The attraction of cohesion is not exerted over *aëriform* or gaseous substances; for while these remain at the temperature necessary for the preservation of their aërial state, their particles mutually repel each other, and would recede to an almost indefinite distance, were they not prevented by the pressure of the surrounding bodies. Thus, a portion of air which can be contained in a vessel of 1 cubic inch of capacity, will fill a vessel of 100 cubic inches of capacity, if the pressure which confines it within the smaller vessel be removed.

One of the most important results of this variety of homogeneous attraction, in a pharmaceutical point of view, is the formation of crystals, or the regular, geometric, and determinate figures assumed by many bodies in passing from the fluid to the solid state, when the passage is gradual, as when the body is slowly cooled, and nothing opposes the union of its particles according to the laws of aggregation. These forms constitute *crystals.*

The process of *crystallization* requires that the particles of the substance to be crystallized be moveable ; and, consequently, in order to obtain any body in a crystalline state, it must first be rendered fluid, either by *solution* in a liquid, or by *fusion.*

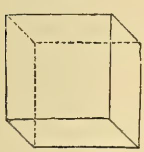
The crystallization of salts is usually effected by *solution.* When a salt is much more soluble in hot water than in cold, as is the case, for example, with sulphate of soda, nothing more is required for its crystallization than to saturate hot water with the salt, and set the solution aside to cool. As the caloric is dissipated, the saline particles gradually approach one another, and uniting, owing to the power of cohesion or homogeneous attraction overcoming that of the affinity of the liquid for the salt, they form solids of a regular shape, the peculiar *crystals* of this salt. But, when the salt is one which

is almost equally soluble in hot and in cold water, as sea salt (chloride of sodium), for instance, its crystallization can be effected only by evaporating a part of the fluid: and the more slowly the evaporation proceeds, the more definite is the shape of the crystals which are obtained. In both cases, however, the attraction of the saline particles for one another at length ceases to act, while, the affinity of the fluid for them remaining the same, as much saline matter as can be dissolved at the temperature of the atmosphere is held in solution; but, by a great reduction of temperature in the one case, and a further evaporation in the other, the solution will again yield crystals.

By *fusion*, bodies which are not soluble in water, as glass, metals, sulphur, &c. are enabled to assume the crystalline form. In this case, the body is, as it were, dissolved or rendered fluid by caloric: and the particles being separated from one another, these, when the cooling is gradual, assume, in aggregating again, the regular arrangements which take place in crystallization. This mode of crystallizing substances is seldom used for pharmaceutical purposes.

Crystallization is promoted or retarded by various circumstances, to be afterwards noticed. Its theory is still obscure; but some light has been thrown upon it by the experiments of Haüy. He found that crystals may be mechanically divided, and reduced to certain primitive forms, which are always the same in the same kind of substances, and depend upon the figure and the mode of combination of the integrant particles composing the crystals. The varieties of figure of these particles, notwithstanding the great diversity of crystalline forms, are reducible to three: namely, 1. the parallelopiped, the faces of which are six, parallel two and two; 2. the triangular prism; and, 3. the tetrahedron, or four-sided pyramid; and these particles, therefore, according to the mode in which they unite, which may be either by their faces or their edges, form primitive crystals, which are the nuclei of the secondary crystals. The forms of primitive crystals may be reduced to the following six: — 1. the *parallelopiped*, which includes the *cube* or *hexahedron*, *a*, consisting of six faces or planes, all the eight angles of the twelve edges of which are equal to 90 degrees; — the *right square prism*, *b*, differing from the cube by its four lateral planes being rectangles, whilst the terminal planes are square; — the *right rhombic prism*, *c*, the terminal planes of which are rhombs, and all the six faces parallel two and two. 2. the *tetrahedron*, *d*, which consists of four equilateral triangles. 3. the *octo-*

a



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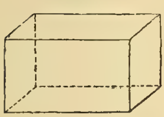

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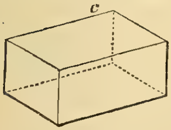

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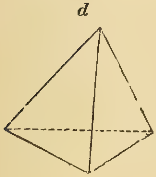

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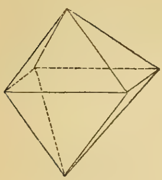

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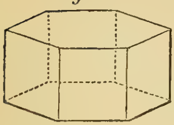

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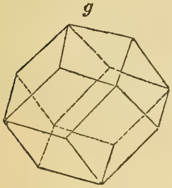
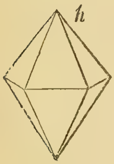


h



hedron, with eight equilateral triangular faces, *e*, all the plane angles of which are equal to 60 degrees. 4. the *hexahedral* or *six-sided prism*, *f*, the lateral planes of which incline to each other at an angle of 120 degrees. 5. the *dodecahedron*, *g*, the faces of which incline to each other at the edges at an angle of 120 degrees; and, 6. the *triangular dodecahedron*, *h*, composed of two six-sided pyramids, applied base to base.

The variations of the forms of secondary crystals are considerable in the same salt, and depend, in general, either on variations in the proportions of the ingredients which compose the integrant particles, or on the properties of the solvent in which the crystals are formed. Thus, alum crystallizes in octohedrons, but the addition of a little alumina produces cubes: thus, also, chloride of sodium, which crystallizes in cubes when dissolved in water, assumes the regular octohedral form when it is crystallized in urine. Independent, however, of these causes, a variety of secondary forms make their appearance; which the theory of Haüy explains, by supposing, that — as the matter which envelopes the primitive nucleus to form a secondary crystal is attracted in thin layers, each layer decreasing in size in consequence of one or more rows of integrant particles being abstracted from its primitive edges or angles — the decrements may be on the *edges* of the slices, which correspond with the edges of the primitive nucleus: or on the *angles*, that is, parallel to the diagonals of the faces of the primitive nucleus; or the decrements may be *intermediate*, parallel to lines situated obliquely between the diagonals and edges of the faces of the primitive nucleus. It would be impossible, however, to give a satisfactory view of this ingenious theory in the narrow compass of this epitome; and therefore I must refer the reader to Brooke's *Familiar Introduction to Crystallography;* Mohs's *Treatise on Mineralogy*, by M. Haidinger; Haüy's *Traité de Minéralogie*, tomes 1. and 2.; to the *Annales de Chimie*, tom. 17.; and the third volume of the fifth edition of Thomson's *System of Chemistry.*

The various forms of crystals have also been arranged by referring them to "*crystalline axes*," which are three straight lines passing through the same point, and terminating in the surface or angles of the crystal. All crystalline forms may, upon this plan, be arranged in six classes or systems,— viz. 1. The octohedral or regular system, having the three axes at right angles to one another and equal in length; 2. The square prismatic, with the axes at

right angles, but two only being equal in length; 3. The right prismatic, with the axes at right angles, but unequal in length; 4. The rhombohedral, with the axes equal, and crossing one another at equal, but not right, angles; 5. The oblique prismatic, with two of the axes intersecting each other obliquely, and the third perpendicular to both, and unequal in length; 6. The doubly oblique prismatic, with all three axes intersecting one another obliquely, and unequal. By the apposition of planes to these different sets of crystalline axes, all the varieties of crystalline forms can be produced.

Such is the Attraction of Aggregation, and its general effects. It is frequently concerned in modifying pharmaceutical results; but it is a power of much less importance than the next variety of *contiguous attraction*, namely,

b. CHEMICAL ATTRACTION, OR AFFINITY.[1]

Chemical attraction, or *affinity*, is that power by which dissimilar substances placed under certain circumstances are enabled to unite, and form new aggregates, in which the properties of the component particles are lost or changed. Its action is confined to the minute atoms or ultimate particles of bodies, and is exerted only at insensible distances, or the closest proximity: not indifferently, however, but electively, between the particles of all bodies. The result of its operation is a *combination* of the constituent particles of the substances, so intimate that the components cannot be recognised, nor separated by any mechanical force: acids combine with alkalies, metals with iodine, chlorine, oxygen, and so on, forming new bodies, with properties distinct from those of either component. Thus, lime acts as a powerful caustic when applied to animal matter, and is partially soluble in water; phosphoric acid has an acid taste, and is very soluble in water; but phosphate of lime, one of the compounds produced by the chemical combination of these substances, is inert, when applied to animal matter, insipid, and indissoluble in water; and cannot be again resolved into lime and phosphoric acid by any mechanical power.

Chemical combination, therefore, is the result of the affinity of two or more substances for each other. It differs from *mixture*, in which the substances are only blended without acquiring any new properties, and in which the dissimilar parts are easily discovered, and may be separated by mechanical powers. Chemical compounds can, however, be decomposed, either by exposure to a high temperature, which weakens the force of attraction existing between their principles; or by mixture, under favourable circumstances, with some other chemical agent, which has a more powerful affinity for

[1] For many of the following observations on affinity I am indebted to the remarks of my late respected friend, Dr. Murray: see his *System of Chemistry*, vol. i.

one of the components than these have for each other; thus, if a solution of camphor in alcohol be poured into water, the alcohol having a stronger affinity for water than for camphor, leaves the camphor to unite with the water, and thus sets the camphor free. In operating by such means, which constitute *chemical analysis*, the principles of a compound may be ascertained.

As *Analysis* separates compounds into their constituent principles, so *Synthesis* may re-produce them by re-combining these principles; and when this can be effected, it is the surest proof of the accuracy of any analysis. In many instances, however, this is impossible; and the evidence of the truth of an analysis is to be drawn from other sources.

It is an acknowledged law of chemical affinity, that a compound "does not possess properties merely intermediate between those of its component parts, but has acquired others more or less new." One of the most general changes is that of form. The combination of two gases, for example, *hydrochloric acid gas and ammoniacal gas*, forms a solid; or two fluids, again, may form a solid, as is demonstrated by dropping into a saturated solution of *chloride of calcium* some concentrated *sulphuric acid;* and the common process of *solution* presents to us the fact, that, by the combination of a solid with a fluid, the solid assumes the fluid form. In the last-mentioned instance the fluid is generally regarded as the active substance; but, nevertheless, the attraction of affinity is reciprocal: hence, the general mode of expressing the fact, namely, that the fluid dissolves the solid, or is the *solvent* or *menstruum*, is, in strict language, erroneous. These terms, however, are more correctly applied, when the properties of the solid, except form, are scarcely sensibly altered; as, for example, when common salt (chloride of sodium) is dissolved in water.

Chemical combination produces an alteration of *density*—that of the compound not being the mean of the components. In the greater number of cases the density is increased; and there is a diminution of volume, owing probably to the compound atom being of a form admitting a more compact aggregation than the component atoms in their separate state; but the specific gravity of a compound cannot be determined by calculation from the specific gravity of its ingredients. There are cases of combination, however, in which the density is diminished, and there is an increase of volume in the resulting compound: for instance, when a solid is dissolved by a liquid, the increase of volume acquired by the solid, passing into the fluid state, may be greater than the condensation resulting from its union in that state with the liquid; and this happens from the solution of a considerable number of the salts in water.

"The exertion of chemical attraction is generally accompanied by a *change of temperature*." Thus, if four parts of sulphuric acid

and one part of water, both at the temperature of 32°, be mixed together, the temperature of the mixture rises 200°; and the density of the compound is much greater than the mean of the densities of the components. The heat, also, which is evolved by combustion, and in fermentation, is the direct consequence of chemical combination. In all cases the increase of temperature is accompanied with an increase of density, to which, and the change of form suffered by one or both of the components, its production may be ascribed. Thus, water, which is solidified, or loses its liquid state by being mixed with quicklime, parts with a large portion of caloric; the contrary effect, however, or an absorption of caloric, is also produced by chemical combination, when the density of the compound is less than the mean; as, for instance, when by solution of salts in water, or the conversion of some other solids into fluids, very intense cold, greater than any natural cold, is artificially produced.[1]

The exertion of chemical affinity is influenced by various circumstances: these, according to Berthollet, are, *quantity*, *cohesion*, *insolubility*, *specific gravity*, *elasticity*, and *efflorescence*.[2]

1. That *quantity* has a considerable share in influencing chemical affinity was first suggested by Berthollet, who states it as a law, that combinations do not depend altogether on the attraction of affinity, but on the proportions also of the substances brought into action. Thus, if A and B form a compound, and C be a substance which has a stronger affinity for A than B has, it should be able, when mixed with a compound, to withdraw A altogether from B, if combination was regulated by affinity only; but this, he affirms, is not the case, in fact: for C does not entirely combine with A, but is shared between it and B, according to the force of the affinity, and the bulk of each. This view of the subject affords a reason why, in pharmaceutical compositions, a small quantity of a substance may be added to a compound, without producing any sensible effect, although, if added in large quantity, decomposition would directly ensue: thence it follows, 1st, that "the chemical action of one substance on another must diminish as it advances to saturation;" and, 2dly, that a decomposing substance "must oppose a stronger resistance to the decomposing agent, in proportion as the decomposition proceeds, from the increase in the relative quantity of one of its ingredients to the other, which is abstracted;" and lastly, "that, in estimating the relative forces of affinity in bodies, the quantities of them must be taken into account, and ought

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[1] See Appendix. Table of freezing mixtures.

[2] Tables of affinity, in which various substances are arranged according to their degree of affinity for a particular substance, will be found in the Appendix; it must, however, be borne in mind, that they are tables of the comparative force of affinity in one set of circumstances only, the order of decomposition being affected by various accessory circumstances, as will be seen below.

to be equal." Objections of considerable weight have been advanced to the opinions of Berthollet on this subject, by Pfaff, Sir H. Davy, and others; but it is unnecessary to enter into an examination of these at the present moment; and we may only observe, that the theory of Berthollet, however plausible, is not unobjectionable, and also, that it is not in accordance with the results of experiment, as demonstrated by M. Dulong.

2. *Cohesion* has an evident influence in opposing chemical action, and counteracting the exertion of chemical affinity. Thus, all aggregates are more slowly acted on by liquids, in which they are soluble, than when their parts are mechanically divided: and this does not happen altogether from the mere circumstance of a larger surface being presented to the fluid; for native oxide of tin, which, in the aggregate, resists completely the action of any acid, becomes soluble when its aggregation is overcome by mechanical operations; and some other substances are similarly affected.

On account of the influence of mechanical division, we find *trituration, levigation,* and *granulation* ranked among pharmaceutical operations. They are of importance "in facilitating chemical action, partly by diminishing aggregation, and partly by increasing the surfaces on which affinity is exerted." In some instances mechanical division is not sufficient, and recourse must be had to precipitation. Thus liquid potassa will not easily dissolve silica in powder obtained by trituration; but when the silica is precipitated from a state of chemical solution, it is readily dissolved in liquid potassa. When copper is newly precipitated from sulphate of copper by means of iron, it is in a state of powder, which, when washed and exposed to a gentle heat to dry, often ignites, and is converted into oxide.

The force of cohesion may be lessened in two ways: namely, by the power of caloric, and by mechanical division. The first acts by producing liquefaction: for owing to the force of cohesion, also, solid bodies seldom act chemically on solids; while fluids readily combine with fluids, and likewise act with energy on solids for which they have an affinity. Fluidity, however, is not indispensable to chemical action; there being many cases in which two solids, in a state of minute mechanical division, act chemically on one another.[1]

When the specific gravities of two fluids are very materially different, their chemical combination is opposed, to a certain extent, by the force of cohesion of the heavier fluid; *agitation,* therefore, is frequently necessary for aiding the operation of affinity.

Cohesion has sometimes a considerable influence in determining the proportion of combination formed in consequence of new

[1] Thence the axiom *Corpora non agunt nisi sint soluta,* which was formerly established in chemistry, is not altogether true.

affinities. Thus, if its intensity be sufficient to counterbalance the affinity of the fluid in which the integrant particles resulting from a new combination are formed, it will combine these, and produce crystallizations or precipitations, which, withdrawing the substance thus formed in part from the sphere of action, and opposing a resistance to any further exertion of chemical power, will, consequently, determine the proportions of the combination.

3. *Insolubility* must necessarily modify chemical action. If an insoluble compound substance be acted on by any substance tending to combine with one of its principles, this is protected, in some degree, by the insolubility of the compound withdrawing it from the action of the decomposing substance; and if a compound, which is produced in the progress of combination, be insoluble, it will be directly precipitated, and thus fixed in its proportions. This is illustrated when a solution of sulphate of zinc is decomposed by acetate of lead: the sulphuric acid and the oxide of lead are both withdrawn, by their combination forming an insoluble compound, namely, sulphate of lead, whilst acetate of zinc is obtained in solution. In decomposition this is extremely useful; for the insoluble product, being immediately separated, cannot oppose the further action of the decomposing substance, which would be the case were it to remain in solution.

4. *Specific gravity* influences considerably the exertion of affinity, particularly if the substance be of little solubility, by withdrawing it from the sphere of action, and hence retarding its combinations; and in many instances this can be but imperfectly counteracted by agitation.

5. Chemical attraction, as far as the aëriform substances are concerned, is opposed by *elasticity*. Thus, when two gases having mutual affinities are mixed together, they very seldom combine, which is ascribed to the distances between the particles of substances existing in the gaseous state; for, as chemical attraction is exerted at insensible distances only, the particles of the two gases, although mingled together, are yet without the sphere of attraction. That this is owing to elasticity, is evident from the circumstance that the vapours which are not elastic more readily combine. Hence, whatever gives density to highly elastic substances—as, for example, mechanical pressure, or cold to a certain degree—must favour their chemical combination.

6. *Efflorescence* may also influence chemical affinity—a fact which was first observed by Scheele, who ascertained that if in a paste composed of several saline substances decomposition is going on, one of the resulting compounds often rises through the mass, and forms an efflorescence on its surface; and its being thus withdrawn from the sphere of action contributes towards forwarding the decomposition.

7. The influence of *temperature* in modifying chemical action is

very considerable. An increased temperature, by promoting fusion, and in other respects weakening the attraction of cohesion in solids, favours combination; but opposes it in some cases, inasmuch as it augments elasticity. In both instances its effects are much modified by the degree of its intensity; combinations effected at a lower being often dissolved at a higher temperature, owing to one or more of the components having its affinity weakened by an increased elasticity. Thus, mercury exposed to air, for some time, at a temperature equal to its boiling point, combines with the oxygen of the air, and is converted into red oxide of mercury; but, if the fire be raised so as to make the retort red hot, this oxide is again decomposed, and running mercury and oxygen gas are obtained.

The order of affinity is also influenced by the nature of the atmosphere in which the elements are placed: thus, steam passed over iron at a red heat, is partly decomposed, oxide of iron being formed, and the hydrogen of the steam set free; but, if a stream of hydrogen gas is passed over oxide of iron at the same temperature, the oxide is decomposed, water is formed, and the iron, reduced to the metallic state, remains. In this manner the Pulvis Ferri of the Dublin Pharmacopœia, the "Fer reduit" of the French, is directed to be prepared. Here the difference of atmosphere, into which the disengaged products can diffuse, influences the nature of the decomposition, the atmosphere of steam favouring the disengagement of the hydrogen, and the hydrogen the formation of the watery vapour.

From the influence of the above circumstances on chemical combination, the utility of those pharmaceutical and chemical operations, which diminish aggregation, overcome the effect of specific gravity, diminish elasticity, and regulate temperature—such as pulverization, trituration, granulation, agitation, and compression, with the proper management of furnaces—is sufficiently obvious.

In that department of pharmacy, also, which regards extemporaneous composition, it is of importance to attend to the slowness with which chemical action is in many instances produced; for substances, which have mutual affinities for each other, may give no indication of any change when newly mixed, but yet, after some time, produce very complete changes. Such compounds, therefore, when they are intended to act *medicinally*, should be exhibited as soon as possible after they are made.

Chemical attraction may be exerted between more than two bodies, so as to bring three or four into one combination; and such compounds are named *ternary*, *quaternary*, &c. according to the number of their components. Several examples of these are to be found among the saline preparations; and almost all the vegetable substances are compounds of three or more principles.

The forces with which chemical attraction is exerted are different in different bodies. In cases where this attraction is exerted in a

superior degree, by a third body, to that of either of the components of a compound of two bodies, so as to decompose it, and form a new compound, while, at the same time, one of the components of the previous compound is set free, the affinity thus exerted has been termed *single elective attraction.* To represent the relative forces of affinity, tables were first constructed by Geoffrey, and afterwards much improved and extended by other chemists, particularly Bergmann. The remarks of Berthollet may have tended to lessen their value in the opinions of some; but their utility to a certain extent must undoubtedly be acknowledged.[1] When the elective attractions are more complicated, or when two elective affinities are exerted, and two new compounds formed, this is termed *double elective attraction.* In such cases, Mr. Kirwan denominated the attractions which tend to preserve a compound in its original state *quiescent;* while the others, which tend to separate the principles of a compound from each other, he termed *divellent attractions.* As examples of single and of double elective attraction, let it be supposed that to a compound of two bodies, say resin in alcohol, we add a third, namely, water; the greater affinity of this for the alcohol than the resin for that fluid makes the alcohol quit the resin, which, therefore, is precipitated: this is *single elective attraction.* Let it be, again, supposed that two compounds in solution, one consisting of potassa and sulphuric acid, or *sulphate of potassa,* and the other consisting of chlorine and calcium, or *chloride of calcium,* are mixed together, a double decomposition will take place, and two new compounds, *sulphate of lime,* and *chloride of potassium,* will be formed: this is *double elective attraction.*

According to the opinions of Bergmann, the relative force of the affinities which produce these effects is capable of being measured, and the changes are altogether to be ascribed to the predominance of the affinities of one set of substances over those of another.

But the changes poduced by the predominance of certain affinities over others are ascribed by Berthollet to those circumstances which influence attraction, and limit combination. If four substances, for example, be presented to each other, two of which have a greater tendency to cohesion than the other two have, so as to form by their union an insoluble compound, instead of one compound being formed by the union of the four, in which the affinities are balanced, this will be averted by the force of cohesion, and the two which form the insoluble compound will unite, and be separated by precipitation or crystallization, leaving the other two in combination in the fluid which has been the medium of action. "If even these four substances were previously in the reverse binary combinations on presenting them to each other, the affinities within the sphere of

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[1] See Appendix.

action must be reciprocally exerted; and the same extraneous forces will cause an exchange of principles, or the phenomena which have been ascribed to elective affinities will be produced." To avoid the term elective attraction, Berthollet denominates cases of this kind *complex affinity.* The explanation of single elective attraction, or where three substances are presented to each other, is precisely the same: the union which takes place between two of them being determined by the tendency to cohesion, or the disposition of the combination of two of them to form a compound of little solubility.

Elasticity, likewise, has a considerable influence in determining decompositions where the application of heat is necessary; and, according to Berthollet, the decomposition of a compound body of which one of the ingredients has a great tendency to assume the elastic form is to be ascribed to the disposition it has to escape from its combination, when aided by the intervention of even a weaker affinity.

In complex affinities the same cause determines the union of substances disposed to assume the elastic form, and separates them as a volatile compound. "If, therefore," says he, "it be desired to know the result of the exposure of two salts to the action of heat, it is only necessary to consider which of the two bases and which of the two acids have the greater volatility, if there be a difference; for the more volatile base and acid will escape and enter into combination, and the fixed base and fixed acid will remain behind, and combine with one another."[1] Tables representing the forces of affinity have been constructed; but, as Dr. Henry has justly remarked, "one great obstacle to the construction of such tables is the difficulty of ascertaining with precision the quantities of bodies required for neutralization."[2]

A knowledge of the doctrines of affinity is of the utmost importance in pharmacy; and, as the foregoing sketch presents little more than an outline, I must refer those who would wish to investigate the subject to Thomson's and Murray's *Systems of Chymistry*, Bergmann's *Dissertation on Elective Attraction*, Berthollet's *Researches into the Laws of Chemical Affinity*, Richter's *Foundation of Stochiometry*, Sir Humphry Davy's *Elements of Chemical Philosophy*, and my friend Dr. Turner's *Elements of Chemistry*.[3]

II. REPULSION.

REPULSION is that force which separates the particles of bodies from one another, and consequently counteracts or modifies the

[1] *Researches*, p. 3. quoted by Murray, *System of Chemistry*, i. 120.
[2] *Henry's Elements of Experimental Chemistry*, 7th ed. vol. i. p. 57.
[3] Now edited by Liebig and Gregory.

attractions by which they are combined and preserved together in masses. It is supposed to depend on the operation of one or more of the three following powers: *Caloric, Light, Electricity.*

1. CALORIC.

The cause of the sensation of heat is denominated *Caloric.* Philosophers are not completely agreed whether it is a property only of bodies[1], or a peculiar substance.

Under this opinion, caloric is regarded as a very subtile, elastic fluid, which penetrates more or less all bodies, passes readily from one body to another, yet cannot be wholly separated from any one. It is every where diffused. Its particles are supposed mutually to repel each other; and bodies into which it enters in any sensible quantity are increased in *bulk,* and undergo other changes of form, while their *density* is diminished. Thus, when *ice* is exposed to the action of heat, the caloric which flows into it separates the particles, and diminishes the cohesive attraction, so that it is converted into water, in which state all the particles are moveable upon one another, owing to the repulsive power of the interposed caloric. Caloric is radiated in the same manner as light, and in this state forms a part of the solar ray.[2] The rays are refrangible, and capable of reflexion, and of polarization, like those of light. It has no ascertainable gravity; and neither the addition nor the abstraction of it alters, sensibly, the weight of bodies.[3] It exists in two different states: in a *free* or *sensible* state, and in an *insensible* state, or one of intimate union.

Regarding it as matter, the sources whence it may be obtained, the laws which regulate its motion and distribution, and its effects, require to be noticed.

Sources of Caloric.

The known sources of caloric are, the *sun, combustion, or chymical action, mechanical action, electricity.* But, for the purposes of pharmacy, the source of caloric is *combustion* or *chymical action.*

Combustion is a source of caloric highly interesting to the pharmaceutist, on account of its utility in conducting its operations.

When a combustible is heated to a certain degree, it becomes still hotter of itself, and evolves rapidly light and caloric, until the whole substance has suffered a change of properties. Hence, combustion may be defined to be "the combination of any two dissimilar bodies, with the evolution of caloric and light." The

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[1] The idea of caloric being motion or vibration originated with Lord Bacon.
[2] *Philosoph. Trans.* 1807.
[3] *Ibid.* 1799, p. 179.

products, whether dissipated as gases or remaining as solid residue, are equal to the substances which have been mutually acted upon.

The nature of this process was first attempted to be explained by Lavoisier, who laid it down as a chemical axiom that, "in every case of combustion, oxygen combines with the combustible body." His explanation of combustion depends on two laws: 1st. That when a combustible body is heated to a certain temperature, it immediately begins to attract and combine with the oxygen of the atmospheric air; 2dly, This oxygen being in a state of gas, and combined with light and caloric, is decomposed during its union with the combustible, and its caloric and light are set free in a sensible form, while the oxygen itself combines with the combustible and forms a new compound. Thus, when phosphorus is burnt in a close vessel containing air, white flocculi form, which weigh heavier than the air consumed, whilst the air loses as much as the phosphorus has gained. The truth of this theory was generally supposed to be proved by the following facts: — 1. That combustion does not go on unless oxygen be present, and it is more brilliant in oxygen gas than in common air; 2. That the products of combustion are always heavier than the body consumed; and, 3. This increase of weight is exactly equal to the quantity of oxygen which the air loses. One objection to this theory—namely, that every combination of oxygen with bodies does not produce the phenomena of combustion—was endeavoured to be explained by Brugnatleli, who supposed that oxygen combines with bodies in two states: — "1. Retaining the greater part of the caloric and light with which it is combined when in the state of gas; and, 2. After having let go all the caloric and light with which it was combined."

The above theory of combustion is, however, liable to objections. 1. It is a well known fact that heat is evolved in chemical action, when the products contain more insensible caloric than the substances that combine to form them: 2. The emission of caloric and light is not proportional to the quantity of oxygen that combines with the combustible, and the quantity of light that appears depends, altogether, upon the combustible. Besides, the phenomena of combustion display themselves when no oxygen is present: thus phosphorus, and some metals in a state of minute division, undergo combustion in chlorine gas. Potassium also burns, emitting heat and light, in cyanogen gas. Berzelius regards the heat of combination as an electrical phenomenon, arising from opposite electrical substances neutralizing one another.

The caloric set free by the burning or combustion of coal, coke, coal gas, charcoal, oil, oil gas[1], wax, tallow, and alcohol, is applied to

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[1] Dr. Dalton states that the combustible gases give out caloric in proportion to the oxygen which they consume.

the purposes of life, and is of the first importance in the practice of pharmacy: hence, endeavours have been made to ascertain the quantity of caloric evolved during the burning of different combustibles, and several experiments have been instituted, by able chemists, at different times, for this purpose. The following table exhibits the quantity of caloric evolved by the combustion of different substances, when all the circumstances are equal, the estimate being formed from the quantity of ice melted during the burning of one pound of each of the substances.[1]

Substances burnt, 1 lb.	Oxygen consumed in lbs.	Ice melted in lbs.			
		Lavoisier.	Crawford.	Dalton.	Rumford.
Hydrogen - -	6·	295·6	480	320	
Carburetted hydrogen -	4·	—	—	85	
Olefiant gas - -	3·5	—	—	88	
Carbonic oxide -	0·58	—	—	25	
Olive oil - -	3·5	148	89	104	93·073
Rape oil - -	—	—	—	—	124·097
Wax - - -	3·5	133	97	104	126·242
Tallow - -	3·5	—	—	104	111·582
Oil of turpentine -	—	—	—	60	
Alcohol - -	—	—	—	58	67·470
Sulphuric ether -	3·	—	—	62	107·027
Naphtha - -	—	—	—	—	97·834
Phosphorus - -	1·5	100	—	60	
Charcoal - -	2·8	96·5	69	40	
Sulphur - -	1·36	—	—	20	
Camphor - -	—	—	—	70	
Caoutchouc - -	—	—	—	42	

The combustion of hydrogen in oxygen gas forms the most intense heat that can be produced.

Although the same weights of different substances yield very

[1] *Thomson's Chemistry*, 4th edit. ii. 610.

different amounts of heat when burnt, yet when the weight of oxygen consumed is the same, the heat evolved appears identical, whatever combustible is employed. Thus, Despretz found that 1 lb. of oxygen burnt with hydrogen, ether, alcohol, and charcoal, heated nearly the same quantity of water (about 29 lbs.) from 32° Fah. to 212° Fah. Phosphorus, however, was found to evolve twice the heat when an equal quantity of oxygen was consumed.

Distribution and Effects of Free Caloric.

From whatever source caloric is obtained, it passes from bodies in which it is accumulated in a free state into bodies which contain less of it, until both are brought to an equilibrium. "The state of a body with regard to its power of producing the different effects arising from the presence of caloric, is termed its *temperature;*" and this depends on the quantity of sensible caloric contained in it. Thus, when a vessel containing water is placed on the fire, a quantity of caloric passing from the fire into the water, the temperature of the water is raised, or it is made sensibly hotter; and if the water, thus heated, be taken from the fire and placed in a cold place, the sensible caloric accumulated in it passes from it into the air and surrounding bodies, until it becomes as cold as they are, or until its temperature be lowered to an equilibrium with theirs. The caloric lost by hot bodies during their cooling is carried off: 1st, by the conducting power of the surrounding medium, which "diminishes as the temperature of the hot body approaches to that of the medium;" 2dly, by radiation; 3dly, by currents, or the repeated changes of the portion of medium immediately in contact with the hot body, produced by the change of density occasioned by the caloric they receive from the hot body, enabling them to rise and give place to a new portion, which, being heated, is also displaced in its turn, and so on till the temperature of the hot body approaches to that of the medium. By accelerating these changes, the rate of cooling is proportionably quickened; and hence the cooling effect of winds and artificial currents of air, advantages which are not to be overlooked in many pharmaceutical processes.

The temperature of bodies can be comparatively ascertained to a certain extent, by the sensations they induce. Thus, a body containing much sensible caloric feels warm or hot to the touch, owing to its caloric flowing into the hand; and one containing less than the human body gives the sensation of cold, owing to the abstraction of caloric from the hand. But this mode of judging of temperature is very limited, and depends on the state of the sentient organ, the conducting power of the body which is touched, and many other external circumstances, which prevent confidence from being placed on it as a comparative measure of temperature; and, therefore, instruments have been invented to measure the degrees

of temperature of different bodies, the properties of which depend on the *expansion* or increase of bulk which bodies suffer when caloric enters into them.

The *thermometer*, one of these, is a most useful and important instrument. It is a glass tube, having at one end a hollow globe or bulb, the bore of the tube being perfectly cylindrical and small, and the bulb of a proportional size. The bulb, and a portion of the tube, after the air is expelled by holding the bulb over the flame of a lamp, are filled with mercury, or coloured spirit of wine, by immersing the open end of the tube in either of these fluids: as the air which still remains in the tube cools, the liquid is forced up into the tube, and supplies the place of the air which heating it had expelled. The remaining air is expelled by boiling the liquid, and the tube is then hermetically sealed at the extremity. When the bulb of this instrument is applied to a hot body, the mercury, or the fluid it contains, rises in the tube, and continues to do so until the thermometer acquires the same degree of temperature as the hot body, when the mercury becomes stationary, and the point to which it rises indicates the relative temperature of the hot body. In the same manner, when the bulb is applied to a cold body, the mercury contracts, and falls in the tube, owing to the abstraction of its caloric by the cold body. The height to which this rises or falls, indicating the proportion of increase or the diminution of temperature, is ascertained by a scale, which divides the tube into a number of equal parts or degrees.[1] As the instrument may be occasionally plunged into corrosive fluids, part of the stem (*a*) and the bulb (*b*) should project beyond the scale; or the scale may turn up with a hinge. Thermometers which enclose the scale in a glass-case affixed to the thermometer in every part, except the bulb, which permits them to be used in the most corrosive media, are now often employed.

For ordinary purposes, mercury is the fluid best adapted for thermometers, its expansion being most equable; but alcohol is used when great degrees of cold are to be measured.[2]

The thermometer commonly employed in this country is that of Fahrenheit[3]; but as three other thermometers are used on the Continent, it may be proper to notice all of them, and point out the circumstances in which their scales differ.

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[1] Thermometers of great accuracy may be purchased. Persons who may wish to construct them for themselves will find ample instruction for their guidance in the third chapter of *Henry's Elements of Experimental Chemistry.*

[2] The first improvement in the thermometer for common use was made by the Academy del Cimento, in 1660; who used spirit of wine as the expanding liquid. Mercury was first employed by Halley and Sir Isaac Newton.

[3] Fahrenheit was an artist of Amsterdam.

Fahrenheit, in forming his thermometer, ascertained two fixed points; that of freezing water, and that of boiling water: the space between these points he divided into 180 equal parts or degrees, and carried the scale downwards 32 degrees, and there fixed its commencement, or zero. The part of the scale, therefore, indicated by the freezing of water he made 32°, which is marked as the freezing point; and the space between it and the boiling point, which is marked 212°, is equal to 180°. The scale may be extended above 212°, and also below zero, the descending degrees being marked inversely with the same numbers as the ascending.

The scale of the thermometer of *Celsius*, which was originally used in Sweden, has been adopted in France since the Revolution. It begins at the freezing point of water, which is consequently marked 0; and the space between that and the boiling point being divided into 100 equal degrees, it has been named the *Centigrade Thermometer*. Each degree of the scale is $\frac{4}{9}$ths more than a degree of Fahrenheit's, or one of the latter is equal to $\frac{5}{9}$ths of a degree of the centigrade scale. To find, therefore, the degrees of Fahrenheit's scale, corresponding to those of the centigrade, the given number of the latter must be multiplied by 9, and divided by 5, adding 32 to the quotient.[1] The sum expresses the degree on the scale of Fahrenheit.

Reaumur's thermometer, which is still used in Russia, Italy, and Spain, also commences at the freezing point, which is marked 0; and between this and the boiling point, it is divided into 80 degrees. Each degree is, therefore, $\frac{4}{9}$ths more than one of Fahrenheit's; and to reduce the scale of Reaumur to that of Fahrenheit, the given number of degrees of the former must be multiplied by 9, and divided by 4, adding 32 to the quotient.

In *De Lisle*'s thermometer, which is now disused, the space between the boiling and freezing points is divided into 150°, the gradation beginning at the boiling point, which is marked 0; and increasing downwards to the freezing point, which is marked 150°.

These instruments are well adapted for determining the variations of temperature which bodies undergo; but a certain degree of fallacy attends the observations made with them, chiefly owing to the expansion of mercury increasing with the temperature. Thus, the medium degree of heat between the freezing and boiling points,

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[1] To determine 212° Fahrenheit on the centigrade, by common arithmetic —

$$\begin{array}{r l} 212^\circ & \text{Fahr.} \\ \underline{32} & \\ 180 & \\ \underline{5} & \\ 9\,)\,\underline{900}\,(& 100^\circ \text{ centigrade.} \end{array}$$

although marked on the scale 122°, yet is actually 118·8° only; the temperature which is equal to raise the mercury in the tube 86° in the first instance, being sufficient, by increased expansion, to raise it 94° in the second.

TABLE showing the Degrees of Reaumur's and Fahrenheit's Thermometers corresponding with those of the Centigrade Thermometer.

Cent.	Reau.	Fahr.	Cent.	Reau.	Fahr.	Cent.	Reau.	Fahr.
100	80·	212·	58	46·4	136·4	16	12·8	60·8
99	79·2	210·2	57	45·6	134·6	15	12·	59·
98	78·4	208·4	56	44·8	132·8	14	11·2	57·2
97	77·6	206·6	55	44·	131·	13	10·4	55·4
96	76·8	204·8	54	43·2	129·2	12	9·6	53·6
95	76·	203·	53	42·4	127·4	11	8·8	51·8
94	75·2	201·2	52	41·6	125·6	10	8·	50·
93	74·4	199·4	51	40·8	123·8	9	7·2	48·2
92	73·6	197·6	50	40·	122·	8	6·4	46·4
91	72·8	195·8	49	39·2	120·2	7	5·6	44·6
90	72·	194·	48	38·4	118·4	6	4·8	42·8
89	71·2	192·2	47	37·6	116·6	5	4·	41·
88	70·4	190·4	46	36·8	114·8	4	3·2	39·2
87	69·6	188·6	45	36·	113·	3	2·4	37·4
86	68·8	186·8	44	35·2	111·2	2	1·6	35·6
85	68·	185·	43	34·4	109·4	1	0·8	33·8
84	67·2	183·2	42	33·6	107·6	0	0·	32·
83	66·4	181·4	41	32·8	105·8	1	0·8	30·2
82	65·6	179·6	40	32·	104·	2	1·6	28·4
81	64·8	177·8	39	31·2	102·2	3	2·4	26·6
80	64·	176·	38	30·4	100·4	4	3·2	24·8
79	63·2	174·2	37	29·6	98·6	5	4·	23·
78	62·4	172·4	36	28·8	96·8	6	4·8	21·2
77	61·6	170·6	35	28·	95·	7	5·6	19·4
76	60·8	168·8	34	27·2	93·2	8	6·4	17·6
75	60·	167·	33	26·4	91·4	9	7·2	15·8
74	59·2	165·2	32	25·6	89·6	10	8·	14·
73	58·4	163·4	31	24·8	87·8	11	8·8	12·2
72	57·6	161·6	30	24·	86·	12	9·6	10·4
71	56·8	159·8	29	23·2	84·2	13	10·4	8·6
70	56·	158·	28	22·4	82·4	14	11·2	6·8
69	55·2	156·2	27	21·6	80·6	15	12·	5·
68	54·4	154·4	26	20·8	78·8	16	12·8	3·2
67	53·6	152·6	25	20·	77·	17	13·6	1·4
66	52·8	150·8	24	19·2	75·2	18	14·4	0·4
65	52·	149·	23	18·4	73·4	19	15·2	2·2
64	51·2	147·2	22	17·6	71·6	20	16·	4·
63	50·4	145·4	21	16·8	69·8	21	16·8	5·8
62	49·6	143·6	20	16·	68·	22	17·6	7·6
61	48·8	141·8	19	15·2	66·2	23	18·4	9·4
60	48·	140·	18	14·4	64·4	24	19·2	11·2
59	47·2	138·2	17	13·6	62·6	25	20·	13·

TABLE exhibiting the Degrees of the Centigrade and Fahrenheit's Thermometers corresponding to those of Reaumur's Thermometer.

Reau.	Cent.	Fahr.	Reau.	Cent.	Fahr.	Reau.	Cent.	Fahr.
80	100·	212·	46	57·5	135·5	12	15·	59·
79	98·75	209·75	45	56·25	133·25	11	13·75	56·75
78	97·5	207·5	44	55·	131·	10	12·5	54·5
77	96·25	205·25	43	53·75	128·75	9	11·25	52·25
76	95·	203·	42	52·5	126·5	8	10·	50·
75	93·75	200·75	41	51·25	124·25	7	8·75	47·75
74	92·5	198·5	40	50·	122·	6	7·5	45·5
73	91·25	196·25	39	48·75	119·75	5	6·25	43·25
72	90·	194·	38	47·5	117·5	4	5·	41·
71	88·75	191·75	37	46·25	115·25	3	3·75	38·75
70	87·5	189·5	36	45·	113·	2	2·5	36·5
69	86·25	187·25	35	43·75	110·75	1	1·25	34·25
68	85·	185·	34	42·5	108·5	0	0·	32·
67	83.75	182·75	33	41·25	106·25	1	1·25	29·75
66	82·5	180·5	32	40·	104·	2	2·5	27·5
65	81·25	178·25	31	38·75	101·75	3	3·75	25·25
64	80·	176·	30	37·5	99·5	4	5·	23·
63	78·75	173·75	29	36·25	97·25	5	6·25	20·75
62	77·5	171·5	28	35·	95·	6	7·5	18·5
61	76·25	169·25	27	33·75	92·75	7	8·75	16·25
60	75·	167·	26	32·5	90·5	8	10·	14·
59	73·75	164·75	25	31·25	88·25	9	11·25	11·75
58	72·5	162·5	24	30·	86·	10	12·5	9·5
57	71·25	160·25	23	28·75	83·75	11	13·75	7·25
56	70·	158·	22	27·5	81·5	12	15·	5·
55	68·75	155·75	21	26·25	79·25	13	16·25	2·75
54	67·5	153·5	20	25·	77·	14	17·5	0·5
53	66·25	151·25	19	23·75	74·75	15	18·75	1·75
52	65·	149·	18	22·5	72·5	16	20·	4·
51	63·75	146·75	17	21·25	70·25	17	21·25	6·25
50	62·5	144·5	16	20·	68·	18	22·5	8·5
49	61·25	142·25	15	18·75	65·75	19	23·75	10·75
48	60·	140·	14	17·5	63·5	20	25·	13·
47	58·75	137·75	13	16·25	61·25			

Thermometers are instruments for measuring moderate degrees of heat. For instance, the mercurial can determine only the temperatures of bodies under 600°; for measuring extremely low temperatures spirit of wine should be employed instead of mercury; and for those beyond a certain point, or intense degrees, the *Register Pyrometer* must be employed. This instrument consists of a metallic bar of little fusibility and uniform expansion. Professor Daniell has ascertained that both platinum and wrought iron answer. The expansion of the bar indicates the degree of heat.[1]

[1] Another pyrometer is that invented by Mr. Wedgewood. It depends on the degrees of contraction which pure argil suffers when exposed to high temperatures; and for this purpose small cylinders of pure clay are made in a mould, flattened on one side, and fitted exactly to the wider end of a gauge, consisting of two straight pieces of brass, 24 inches long, fixed on a brass plate so as to converge, and divided into

Expansion, or increase of bulk, is the most general effect of heat, and, with very few exceptions, may be regarded as the general law of its operation. When caloric flows into a body, it separates its integrant particles from one another, and hence augments its volume. This change is smallest in solids, more considerable in liquids, and most in gaseous bodies; or the expansibility is in the reverse ratio of the force of aggregation. Thus the expansion of air is 8 times greater than that of water; and the expansion of this 45 times greater than that of iron.

The expansion of solid bodies, is, in general, so very inconsiderable as not to be easily ascertained by measurement; but, as far as it can be known, it is nearly equable. The degree of expansion, however, is not the same in all solids: thus, for example, the metals expand in the following order, commencing with the least expansible: platinum, antimony, iron, bismuth, copper, tin, lead, zinc. Argil is an exception to the law of expansion in solids; for the bulk of pure clay diminishes, when heated, in the ratio of the intensity of the heat to which it is exposed. The cause of this anomaly has not been discovered. The expansion of liquids is more evident than that of solids, but not uniform—the differences apparently depending on the greater or less volatility of the liquids; those expanding the most, the boiling point of which is lowest, and which, consequently, most readily assume the gaseous form. The degree of their expansion, also, increases with the augmentation of the temperature; or, the nearer a liquid approaches to the boiling point, the greater is the expansion produced by each degree of caloric; and the further it is from this point, the more equable is the expansion. Liquids, in the same manner as solids, suffer a difference of expansion from a given change of temperature. The table, by Dr. Dalton, given at the top of next page, shows the expansion of the more common liquids, from 32° to 212° Fah., the volume at 32° being denoted by 1.

To the general law of the expansion of liquids by heat, water furnishes an exception. Thus, from the lowest temperature at which water can remain liquid, to 40°, or 39·39° Fahrenheit[1], heat diminishes the bulk of water, instead of expanding it; but above 40° to 212°, expands it. On the other hand, when caloric is abstracted from water at 40°, it expands as the refrigeration proceeds.

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inches and tenths. The length to which the pyrometrical pieces can be slid in the converging groove indicates the heat to which they have been previously exposed; and, as they do not expand again when cold, no fallacy can result from the action of heat on the gauge. Each degree of this scale is equal to 130° of Fahrenheit; and the 0, or commencement of it, corresponds with 1077½° of Fahrenheit's scale. The highest temperature that has been measured by it is 160°, or 21,877° of Fahrenheit, which is 30° above the point at which cast iron melts. But, as much higher temperatures than this must exist, so, also, there are temperatures much lower than can be measured by any thermometer.

[1] *Hallstrom, Ann. de Chimie et Phys.* t. xxviii. p. 90.

TABLE showing the Expansion of the more common Liquids.

$\cdot 0200 = \frac{1}{50}$	Mercury.	$\cdot 0700 = \frac{1}{14}$	Oil of turpentine.
$\cdot 0466 = \frac{10}{212}$	Water.	$\cdot 0700 = \frac{1}{14}$	Ether.
$0\cdot 500 = \frac{1}{20}$	Water saturated with salt.	$\cdot 0800 = \frac{10}{125}$	Fixed oils.
$\cdot 0600 = \frac{1}{17}$	Sulphuric acid, sp. gr. 1·185.	$\cdot 0110 = \frac{1}{9}$	Alcohol.
$\cdot 0608 = \frac{1}{17}$	Muriatic acid, sp. gr. 1·137.	$\cdot 0110 = \frac{1}{9}$	Nitric acid, sp. gr. 1·40.

All gaseous bodies suffer the same expansion by the same additions of caloric, supposing the circumstances to be equal. Their expansion is almost perfectly equable, or the same augmentation takes place by the same addition of caloric at every degree of temperature between the freezing and the boiling point of Fahrenheit's thermometer. By the experiments of Gay Lussac, 100 parts of atmospheric air, heated from 32° to 212°, expand 137·5 parts or $\frac{1}{480}$th for every degree of the thermometer; and the other gases, the steam of water, and the vapour of ether, undergo the same expansions by the same augmentations of temperature. The cause of the equable expansion of gaseous bodies appears to be the absence of cohesion; so that, at a low temperature, there is no more resistance made to the expansive power of the caloric thrown into the gas, than at a high temperature.

But, besides the change in bulk produced by the introduction of caloric into substances in different quantities, they are changed in state, assuming the *fluid form* and that of *vapour;* or, they are *ignited.*

Fluidity is an effect of caloric, arising from the repulsive force of the caloric, which entering into any substance fitted to take on the fluid form, separates the particles from one another to such a distance as to render them easily moveable on one another in every direction. All solids, with a very few exceptions, are susceptible of the fluid form, when exposed to a sufficient degree of heat; and all liquids, with the exception of alcohol, become solid when exposed to very low temperatures. The particular temperatures necessary for the production of these changes, however, are exceedingly various, but for the same bodies they are always the same.[1] In

[1] The following table showing the degree of temperature, according to Fahrenheit's thermometer, at which several solid bodies melt:—

some cases, the change is sudden, or the body instantly passes from the solid to the liquid state; in other cases, it passes through several degrees of softness before it be perfectly liquefied: the conversion of ice into water is an example of the first; the melting of glass, of wax, and unctuous matters, which become first viscous, are instances of the second. There are some bodies, nevertheless, which cannot be melted or *fused*, owing to their suffering chemical decomposition at a lower temperature than is required for their *fusion* under the ordinary pressure of the atmosphere: — a piece of wood, for instance, cannot be melted by the application of any degree of heat.

Although the melting point, in most cases, is always the same in the same bodies, yet circumstances may vary it; and the admixture of other substances may alter it very considerably. Thus, the melting point of ice, or, what is generally the same thing, the freezing point of water, is 32°; but by exposing water slowly to the action of freezing mixtures, it may be cooled down to 22° before it freezes. The addition of salts renders this point still lower, as may be seen by the following table.[1]

Names of salts.	Proportion by weight dissolved in 100 parts of water.	Freezing point.
Common salt - -	25·	4·
Sal ammoniac - -	20·	8·
Rochelle salt - -	50·	21·
Sulphate of magnesia -	41·6	25·5
Nitre - - -	12·5	26·
Sulphate of iron -	41·6	28·
——— zinc -	33·3	28·6

When solids pass to the liquid state they receive an additional quantity of heat, which combines with them, but does not sensibly elevate their temperature; and this *caloric of fluidity* or *latent heat*, as it has been named, is again given out in a sensible form, when the body returns to a solid state. If water, for example, be exposed to a great degree of cold, and kept free from agitation, it may be cooled several degrees below the freezing point, namely, to 21°, and yet remain fluid; but if it be then agitated, it instantly congeals, and at the moment of its congelation its temperature

Lead - - -	612°	Copper - -	1996°	Spermaceti - -	112°
Bismuth - - -	476	Silver - -	1873	Phosphorus -	100
Tin - - - -	442	Iron - - -	21637	Tallow - -	92
Zinc - - -	773	Sulphur - -	218	Oil of anise -	50
Antimony - -	809	Bees' wax - -	149	Camphor - -	303
Mercury - -	—39	Lard - - -	97	Ice - - -	32

[1] *Phil. Trans.* 1788, 27., quoted by Dr. Thomson, *Syst. Chemistry*, 4th edit. i. 520.

rises to 32°. All fluids, therefore, are combinations of solids and certain doses of caloric.[1] Thus, if snow at 32° be mixed with an equal weight of water at 172°, the snow instantly melts, but the temperature of the mixture is only 32°; so that 140° of caloric have disappeared, or rather have entered the ice; and as the caloric is no longer sensible to the thermometer, it is justly said to have become latent: hence the quantity of caloric necessary to give fluidity to ice is 140°. These facts were first ascertained by Dr. Black, in 1762; and fluidity in general has been proved to depend on a similar cause. Softness, plasticity, malleability, and ductility, probably depend also upon the repulsive force of the latent heat which combines with bodies.

Vapour, which is another effect of caloric, is that state into which all fluids and some solids pass when their temperature is raised to a certain point, sufficient to separate their integrant particles to distances beyond the sphere of the attraction of cohesion; and, were they not restrained by the atmospheric pressure, they would fly off to an immeasurable distance. The fluid thus gradually passes to the state of vapour, becoming invisible and elastic, and possessing the other mechanical properties of air.

Evaporation, however, is also spontaneously produced, partly by the agency of caloric alone, partly by the absorbing power of atmospheric air, forming a solution of the body in the aërial fluid. By *spontaneous evaporation*, the fluid is gradually converted into the aëriform state at every temperature. Water, alcohol, ether, volatile oils, and even mercury[2], are susceptible of spontaneous evaporation; so that a portion of any of them exposed to the air, in a flat vessel, gradually disappears; "but sulphric acid and the fixed oils never assume the form of vapour till they are raised to a high temperature."

All fluids have a fixed point of temperature at which they are converted into steam, which is denominated their *boiling point;* and beyond this point fluids cannot be heated, if freely exposed to the air so as to allow the steam to escape as it forms. Thus water at 212° boils, and is progressively converted into steam at the bottom of the vessel, which, rising in bubbles through the water, produces the ebullition that characterises boiling; but although the fire be raised ever so much, yet the temperature of the water never exceeds 212°, the steam carrying off every additional increment of heat in a latent form. The *boiling point*, as this degree of temperature is termed, varies in different bodies; and in the same body also, if it be placed under different circumstances, particularly with regard to pressure. Thus, at a mean barometric pressure of thirty inches, the boiling points of several liquids are as follows:

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[1] Assuming heat or caloric to be a material substance, and not the result of an undulation.

[2] Faraday.

that of ether, sp. gr. 0·736, is 100; of alcohol, sp. gr. 0·813, 173·5°; of pure water, 212°; of water saturated with common salt, 225°; of oil of turpentine, 316°; of mercury, 655°; nitric acid, sp. gr. 1·500, 210°; sulphuric acid, sp. gr. 1·848, 600°; and so on. In a vacuum all liquids boil at a temperature of 140° lower than in the open air[1]; and in Papin's digester, in which water can be heated under a great pressure, the temperature may be raised to 300° without ebullition. Owing to this circumstance, highly volatile substances, as ammonia and ether, cannot easily be manufactured in elevated situations.[2]

The elasticity of the vapour of liquids boiled in the open air is equal to that of the circumambient atmosphere; but, under such a pressure that the temperature of the vapour may be much augmented, the elasticity increases with the temperature. At low temperatures, on the contrary, vapours lose their elasticity, are condensed, and return to their fluid state. The conversion, therefore, of liquids into elastic fluids depends on the same cause as the conversion of solids into fluids; namely, "the combination of a certain dose of caloric with the liquid, without any increase of temperature."[3] The vapour carries off all the caloric which enters a fluid after it arrives at its boiling point, and retains it in a latent form; for the vapour is not sensibly hotter than the boiling liquid: thus, steam, the temperature of which is indicated by the thermometer to be 212°, is water combined with 967° of caloric, which remain latent as long as the temperature of the steam is maintained at 212°, but is again given out when a lower temperature changes that vapour to the state of a liquid. The vapour of water at 212° contains 1000° of latent heat, that of alcohol 457°, that of ether 312·9, of oil of turpentine 183·8, of nitric acid 530, of ammonia 865·9, and of vinegar 903.[4] Bodies which resist the greatest known heat without vaporization are said to be fixed in the fire.

Gases resemble vapours in their constitution, but differ from them in the greater reduction of temperature which is required for their condensation, some of them not being reducible by ordinary pressure, or by any known reduced temperature, to the fluid or solid state. Ammoniacal gas condenses into a fluid at 45°; and, many of the other gasses, for example, carbonic acid gas and chlorine, have been condensed into fluids.[5] Different gasses yield

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[1] *Professor Robinson, Black's Lectures*, p. 151.

[2] At the summit of Mont Blanc water boils at 187° Fahr.

[3] The important discovery of the causes which produce the changes of bodies from the solid to the liquid and aëriform state was made by Dr. Black, in 1760.

[4] *Ure, Phil. Trans.* 1818.

[5] Dr. Faraday has done much to illustrate this fact. Carbonic acid requires a pressure equal to 35 atmospheres, or 525 lbs. on each square inch of surface, to liquefy it; chlorine requires 4 atmospheres; cyanogen, 4; ammonia, $6\frac{1}{2}$; hydrochloric acid, 40. Carbonic acid can now be reduced to a solid state, by the cold produced from the rapid evaporation of a portion when in a liquid condition.

to different degrees of compression. The distinction between a vapour and a gas is only in degree.

Ignition is another effect of caloric, but differing altogether from expansion, fluidity, and vaporization, which may in some measure be regarded as different degrees of one general effect. It implies an emission of light from bodies which are much heated, or combined with a large portion of caloric, without their suffering any change of composition. It is totally independent of the presence of air, and is a simple effect of caloric. Aëriform substances are not susceptible of ignition.

The degree of temperature at which all bodies capable of ignition begin to be ignited, or become red-hot, is nearly the same,—about the 1,000th degree of Fahrenheit in broad day, but between the 600th and 700th in the dark: by raising the temperature the illumination increases, until a perfectly white light is produced, which is the highest point of ignition. Ignition is supposed to arise from the extrication of the light, which is regarded as a constituent of the ignited body, by the repulsive agency of the additional caloric; but this explanation of the phenomenon is liable to some objections, and the real cause remains still undetermined. When ignition takes place in the air, oxidizement often results.

As a pharmaceutical agent *Caloric* is of the first importance. In the majority of cases it produces decomposition; but in some it favours combination. The decomposition most easily effected by it is the separation of the more volatile from the more fixed ingredients of compounds. Thus, in the process of distillation, when weak spirits are heated, the alcohol separates from the water, owing to its superior volatility, and, by condensation in a different vessel, it is obtained as a distinct substance. Almost all compounds into which oxygen has entered without having occasioned combustion, such as nitric acid, and some metallic oxides, suffer likewise decomposition by caloric. All compound bodies containing combustibles are also decomposible by it; as are also compounds consisting of two or more combustible ingredients, in combination with oxygen, as almost all animal and vegetable matters. On the contrary, the compounds which are little or not at all affected by caloric, as far as regards their composition, are those which have been formed by combustion: such, for instance, as water, phosphoric acid, and carbonic acid.[1] The proper application of caloric for the purpose of obtaining new combinations by lessening the force of aggregation, and thus favouring the attraction of affinity, or for producing decompositions by weakening or destroying altogether the force of these attractions so as to obtain the principles of bodies in a distinct state, constitutes the most important feature of operative pharmacy.

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[1] *Thomson's Chemistry*, 4th edit. i. 546.

2. LIGHT.

The nature of light has as yet not been fully determined. By some it is supposed to consist of very minute particles, sent off with great rapidity, and in all directions, from the luminous body; but according to the theory which has most supporters, light consists, or is produced by, an undulation in a highly elastic, non-gravitating, medium, which is supposed to fill all space, and which has been named Ether. Light is sent forth in all directions from every point of a luminous body in straight lines, with a velocity which has been estimated at the rate of 195,000 miles a second.

When a ray of light falls upon a body, it is either reflected, transmitted, or absorbed.

The law of reflection is as follows:—The angles of incidence and of reflection, measured from a line perpendicular to the surface, are always equal.

By this law all the phenomena of reflection, from plane, concave, and convex surfaces can be explained.

When a ray of light passes through a transparent medium, it is found to be bent at the surfaces or refracted. If from a rarer into a denser medium, the ray is refracted towards a line drawn perpendicular to the surface; if from a denser into a rarer medium, an opposite bending takes place. The law of refraction in uniform medium is as follows:—The sines of the angles of incidence and of refraction have a constant ratio to one another; and making the sine of the angle of réfraction unity, the number representing the sine of the angle of incidence is called the exponent or index of refraction. Different bodies have very different refractive powers; thus, in the diamond the index of refraction is 2·439 (Newton); in crown glass, about 1·53; ice, about 1·308; oil of cassia, 1·641; oil of pimento, 1·507; oil of turpentine, 1·475; oil of lemons, 1·379; water, 1·335. The refractive power has been used as test for the purity of some substances: thus, Dr. Wollaston found that genuine oil of cloves had an index of refraction 1·535, while in an impure specimen it was only 1·498. It was also from the highly refractive power of the diamond, that Sir Isaac Newton suggested its inflammable nature. From the law of the refraction of light given above, the phenomena presented by convex, concave, and other lenses can be deduced.

White light is not simple, but is composed of rays of different colours, as can be readily demonstrated. If a ray of white light passes through a glass prism, where the refraction from the two surfaces would be in the same direction, it is found not only to be bent, but also to be separated into its component parts, arising from the different coloured lights being differently refracted; and if we employ a circular aperture, it is found that on the screen receiving the light, a lengthened band is produced, composed of different colours, called the prismatic spectrum, the colours being red, orange, yellow, green, blue, indigo, and violet, the violet the

most, the red the least, refrangible. If solar light is used, it is found that the heat is greatest a little beyond the red extremity, and that there exist rays capable of causing decomposition in certain bodies, called chemical rays, which are in greatest quantities just beyond the violet end of the spectrum.

Sir David Brewster has established the existence of these primary colours in the spectrum, viz. blue, yellow, and red. A certain quantity of each of these colours exists at all points, but the blue predominates at the top, the yellow somewhat below the middle, and the red at the bottom of the spectrum; the seven different coloured bands of Sir Isaac Newton, are therefore not pure colours, but mixtures; thus, green is produced by a predominance of the yellow and blue rays, orange by yellow and red, &c. &c.

Light enters into combination with bodies; and, in some cases, is again extricated without any change being produced; as in pyrophori, or substances which absorb light, and emit it again when carried into a dark place. In some cases, however, the absorption of light by bodies occasions very sensible changes in them: the colour of plants, for example, their taste and odour, and quantity of combustible matter they contain, depend on light; for a plant reared in the dark is nearly colourless, insipid, and inodorous.

Light partially deoxidizes metallic oxides and salts. Thus it blackens chloride of silver; and as this takes place when the salt is placed beyond the violet ray, or out of the prismatic spectrum, the effect is apparently to be attributed to the action of a species of rays that excite neither heat nor light. It also reduces the nitro-hydrochloric solution of gold, when it is placed in contact with charcoal, or any other vegetable, or any animal matter; and the red oxides of mercury and of lead become much paler when exposed to the sun. The rays that produce these effects are the least refrangible. Dr. Wollaston, however, has pointed out one exception to this effect of these rays, in guaiacum, which becomes green, or oxidized, in the least refrangible rays; and is again changed to yellow, or deoxidized, in the most refrangible.

Light has a powerful tendency to decompose nitric acid, which it renders red and fuming, even when it is contained in vessels accurately closed. Almost all the vegetable and animal colouring matters have their brilliancy and colour much impaired by long exposure to the sun's rays; and the colour and the properties of vegetable powders kept in clear glass bottles are also affected by them. Light even seems to have a strong influence on the process of crytallization; for, if light be only partially admitted to a crystallizing solution, the crystals will be larger and more numerous on the enlightened side; and often the whole mass will radiate towards this point. This is daily illustrated by the crystals of camphor deposited on the sides of glass jars, containing it, exposed in the windows of druggists. Chaptal found that by using a solu-

tion of a metallic salt, and shading the greater part of the vessel from the light, capillary crystals shoot up the uncovered side, and the extent of the exposed part is distinctly marked by the limit of the crystallization.

Light also promotes combinations. A mixture of chlorine and hydrogen slowly combine in a feeble light; but in sunshine the combination is so rapid as sometimes to cause explosion.

On the action of the chemical rays contained in solar light upon certain chemical compounds, depends the art of photography, or obtaining impressions on metallic plates or prepared paper.

Polarization of Light.—When a ray of light falls at an angle of 56° 45′ on a polished plate of glass, and, in being reflected from it, falls upon another plate of glass, so placed that its angle of incidence is also 56° 45′, the second plate may be turned round its axis without varying the angle which it makes with the ray that falls upon it. If the two planes of reflection be parallel to each other, the ray of light is reflected in the same manner from both plates of glass; but if the second plate be turned round a quadrant of a circle, so as to make the plane of reflection perpendicular, the whole ray will pass through it, and none of it be reflected; yet, if this plate be turned round another quadrant of a circle, so as to make the reflecting planes again parallel, the ray will be now reflected by it as at first. The light can penetrate through the glass only when the reflecting planes are perpendicular, but is reflected when they are parallel. This property of light has been termed by Malus, by whom it was first discovered, its *polarization*.

That portion of the light which has been transmitted through the plate before described, is also found to have partially acquired peculiar properties, or to have become polarized; and by using several plates, placed parallel to each other, the whole of the transmitted ray may be thus altered. When a ray of light passes through a crystal of any salt, not belonging to the regular system, as Iceland spar, in any other direction but in that of the axis, it will be found to be split into two rays, one following the ordinary law of refraction before mentioned, and the other a different one; hence the latter is termed the extraordinary ray. Both of these rays have acquired the peculiar properties of polarized light, but the planes of polarization are at right angles to one another. Hence, any objects when seen through these crystals, if of sufficient size, are doubled. But if, in an uniaxial crystal, a ray of light passes through the optical axis, no change takes place; and a beam of polarized light transmitted in the same way will also be unaffected. If, however, in place of Iceland spar, quartz is used, and the polarized ray transmitted through its axis, it will be found to have experienced a change, depending on the power which the rock crystal possesses of turning the plane of polarization; it is also found that some specimens of quartz turn the ray towards the right, and others towards the left.

If heterogenous light is used, colours appear, owing to the plane of polarization of the different coloured rays undergoing a different amount of turning.

Since the discovery of circular polarization by rock crystal, it has been found that certain organic liquids also possess this property, such as solutions of sugar, oil of turpentine, and other essential oils, albuminous fluids, &c. It is also found that some liquids turn the plane of polarization to the right, others to the left, as in the different specimens of quartz. This peculiar property has been made use of for the purpose of distinguishing certain closely allied substances, and also ascertaining their purity, and the strength of certain solutions. It has also been used for ascertaining the presence and amount of sugar in urine of diabetes, and the quantity of albumen in serum. Common polarized light has also been employed with the microscope, to ascertain the structure of certain organic substances, as starch granules, &c.

For details on this subject the reader is referred to various works on optics, and to Dr. Peireira's lectures on the polarization of light.

3. ELECTRICITY.

The phenomena of the different forms of electricity and its application in the treatment of disease will be found in the Appendix.

SECTION II.

EVERY substance, whether it be regarded generally as forming a part of the mass of this globe, or particularly as an object of science, may be arranged in one or other of the three following classes: *Solids*, *Fluids*, and *Gaseous Bodies.*

Solid bodies are masses of minute particles combined and held together by the attraction of aggregation or cohesion. The arrangement of the particles with regard to one another is often such as to produce regular figures, in which case the solids are said to be crystallized. Cohesion and crystallization have been already considered.

It has been before observed, that by throwing caloric into a solid body, or, in other words, heating it, the force of the attraction of cohesion, which preserved it in the solid state, is gradually weakened, and finally overcome. When the particles of a body which, at a low temperature, were immoveable relatively to each other, are separated by heat so as to move easily upon one another, but are yet within the limits of the sphere of the attraction of aggregation or cohesion, the body is denominated a *liquid.* Thus *Ice,* when brought into a place, the temperature of which exceeds 32°, loses

its solidity, and becomes a liquid, or water. By a yet further application of heat, the repulsive force of the particles for one another is so strongly developed, that they are driven without the sphere of mutual attraction, and disperse in all directions, or, in other words, they assume the gaseous form. Thus water when heated about 212 Fahr. is converted into steam.

Bodies are either simple or compound; those that contain one kind of matter only, and which have not yet been further decomposed, are named simple bodies or elements: at the present time they are 59 in number. Of these four are gases, at the ordinary temperature and pressure of the atmosphere,—viz. oxygen, chlorine, hydrogen, and nitrogen; two are liquid,—bromine and mercury,—and the remainder solid or semi-solid. An examination of the composition of a class of substances containing an element in common, as the oxides, shows that any one element unites with very different quantities of the other elements; thus, 8 parts by weight of oxygen combine with 1 part of hydrogen, with 31·66 parts of copper, with 16 of sulphur, &c. &c. Now, if such numbers represent the proportions in which the different elements combine with the same quantity or 8 parts of oxygen, they also represent the proportions in which they unite among themselves: the term equivalent is applied to these numbers; they represent quantities capable of exactly replacing one another in combination: for the same reason, the numbers are said to be the combining quantities of the elements. Although matter is capable of being divided to an extent beyond our powers of conception, it is possible that it may not be indefinitely so, and that there may be a limit beyond which particles of matter cease to be further divisible. Dalton made this assumption, that all matter consisted of atoms, and these atoms differ in weight in different kinds of matter, being in the same relation to each other as their equivalent combining proportions: this theory enables us at once to explain the doctrine of equivalent and multiple proportions, for compounds must be formed by the union of atoms of bodies in the relation of 1 to 1, or 1 to 2, or some other simple proportion.

In the present nomenclature the elementary bodies are usually represented by the first letter of their Latin names, but as the names of many begin with the same letter, the first one is frequently conjoined with a small one, contained also in the word. Carbon is thus represented by C, potassium (kalium) by K, magnesium by Mg, &c.: these symbols are not merely used as contractions, but to represent an equivalent of each element; thus the letter K does not represent potassium in the abstract, but compared with the symbol O (eq. 8) it represents 38 parts by weight: any number of equivalents are expressed by placing the number before the symbol, or above and to the right, or below to the right; thus 4 eqs. of potassium may be represented, 4K, or K^4, or K_4: com-

pounds are represented by juxta-position of symbols, or by placing a comma or the sign of addition between them; thus potash may be represented as K O, or K, O, or K + O.

The following is a table of the elementary substances, with their equivalents and symbols, taken from the *Elements of Chemistry* of Professor Graham.

Names of Elements.	Symbols.	Equivalents. Hydrogen=1.	Names of Elements.	Symbols.	Equivalents. Hydrogen=1.
* Aluminum	Al.	13·69	Niobium		
* Antimony (Stibium)	Sb.	129·03	* Nitrogen	N.	14·
* Arsenic	As.	75·	Osmium	Os.	99·56
* Barium	Ba.	68.64	* Oxygen	O.	8·
* Bromine	Br.	78·26	Palladium	Pd.	53·27
* Bismuth	Bi.	70·95	Pelopium		
* Boron	Bo.	10·90	* Phosphorus	Ph.	32·02
Cadmium	Cd.	55·74	* Platinum	Pt.	98·68
* Calcium	Ca.	20·	* Potassium (Kalium)	K.	39·
* Carbon	C.	6·	Rhodium	R.	52·11
Cerium	Ce.	46·	Rutherium	Ru.	52·11
* Chlorine	Cl.	35·50	Selenium	Se.	39·57
Chromium	Cr.	28·15	* Silicium	Si.	21·35
Cobalt	Co.	29·52	* Silver (Argentum)	Ag.	108·
* Copper (Cuprum)	Cu.	31·66	* Sodium (Natronium)	Na.	22·97
Didymium			Strontium	Sr.	43·84
Fluorine	F.	18·70	* Sulphur	S.	16·
Glucinum	Gl.	26·50	Tantalium or Columbium.	Ta.	92·30
* Gold (Aurum)	Au.	98·33	Tellurium	Te.	66·14
* Hydrogen	H.	1·	Thorium	Th.	59·59
* Iodine	I.	126·36	* Tin (Stannum)	Sn.	58·82
Iridium	Ir.	98·68	Titanium	Ti.	24·29
* Iron (Ferrum)	Fe.	28·	Tungsten (Wolfram.)	W.	94·64
Lanthanum	Ln.	48·	Uranium	U.	60·
* Lead (Plumbum)	Pb.	103·56	Vanadium	V.	68·55
Lithium	Li.	6·43	Yttrium	Y.	32·20
* Magnesium	Mg.	12·67	* Zinc	Zn.	32·52
* Manganese	Ma.	27·67	Zirconium	Zn.	33·62
* Mercury (Hydrargyrum)	Hg.	100·07			
Molybdenum	Mo.	47·88			
Nickel	Ni.	29·57			

An asterisk is placed against those elements which enter into the composition of substances used in materia medica, or for testing the purity of preparations.

The number of elements which enter into the composition of inorganic compounds are very numerous: these bodies, however, are in general very stable, and are formed on what is termed a binary plan of combination; union taking place between pairs of elements, and the bodies thus produced uniting themselves to other pairs in the same manner. Thus, iron and oxygen combine, forming oxide of iron; potassium and oxygen forming potash; and sulphur and oxygen forming sulphuric acid: sulphuric acid in its turn combines with oxide of iron and potassium, forming a pair of salts which are themselves capable of combining, forming the

compound $KO, SO_3 + FeO, SO_3$. We rarely find in the inorganic kingdom that the elements enter into the composition of the compound atom in many proportions; for example, potassium seldom exists in more than one proportion in any of its salts. In the organic kingdom, on the other hand, the number of elements employed to produce all animal and vegetable substances are but six in number, —carbon, hydrogen, nitrogen, oxygen, sulphur, and phosphorus; these combine, however, in a great variety of ways, each different combination producing a different substance: moreover, the number of proportions which enter into the compound atom are very numerous, and the compounds comparatively unstable, and more easily broken up into simple bodies, similar to those found in the inorganic kingdom. On this last property the principle of organic analysis is founded. This is effected by heating the substance, with certain precautions, in a tube with oxide of copper, and collecting the products of the combustion, viz. carbonic acid and water, the former in a solution of potash, the latter by chloride of calcium; by subtracting the weight of the carbon and hydrogen found from the weight of the substance, the amount of oxygen can be determined. Nitrogen can be estimated by heating the substance with caustic alkali, when it is eleminated in the form of ammonia, which can be collected in a solution of chloride of platinum, and weighed. Sulphur and phosphorus, which are seldom present except in the animal kingdom, can be converted into sulphuric and phosphoric acids by oxidizing agents, and estimated in these forms.

A short account of those elementary bodies which enter into the composition of some pharmaceutical preparations, but which are not used as medicinal agents or described in Parts II. or III., will be found below.

Aluminum.—This metal enters as an oxide into the composition of alum, from which circumstance it derives its name; it may be prepared from the chloride of aluminum by heating with potassium; chloride of potassium is formed with disengagement of much heat, and the aluminum set free; it has a metallic lustre resembling tin, and is malleable.

Boron.— This element occurs as a dirty green-coloured powder: it is converted by heating it in air, into boracic acid, which is the only known oxide.

Calcium.—The metallic base existing in lime; it is obtained by passing the vapour of potassium over lime heated strongly in a tube. It is of a silver-white colour, and very readily oxidized.

Hydrogen, from ὕδωρ (water) γεννάω (I give rise to), derives its name from being one of the elements in water; and it is generally prepared by deoxidizing that fluid: this may be accomplished in several ways, as by passing steam over iron heated to redness in a tube; oxide of iron is formed at the expense of the oxygen of the steam, and the hydrogen is liberated: it is more readily prepared

by placing fragments of zinc in water which has been acidulated with sulphuric acid. Sulphate of the oxide of zinc is then formed, and hydrogen eleminated. When pure, it is a gas destitute of odour, colour, or taste; of very low specific gravity, 100 cubic inches weighing only 2·14 grains; it is inflammable, burning with a dull flame, evolving much heat, and producing water; it is not a supporter of combustion, and is not capable of sustaining life. Water contains 2 volumes of hydrogen to 1 of oxygen by measures, and 1 part of hydrogen to 8 parts of oxygen by weight. When previously mixed with oxygen, and the two gases kindled as they issue from a jet, the most intense heat that can be produced is obtained.

Magnesium is prepared from the chloride in a manner similar to that given for the preparation of aluminum: it is a white malleable metal; when heated in the air, it burns, and produces magnesia, the only known oxide.

Nitrogen constitutes about $\frac{4}{5}$ of the atmosphere, from which it may be obtained by depriving a portion of air confined in a jar of its oxygen, by burning in it a piece of phosporous: it may also be procured by passing a stream of chlorine gas through a solution of ammonia, the chlorine combining with the hydrogen of the ammonia to form hydrochloric acid, while the nitrogen is liberated. It is lighter than air, its density being ·972, colourless, inodorous, not capable of supporting combustion or respiration, very slightly soluble in water.

Oxygen forms about $\frac{1}{5}$ of the atmosphere, and is generally procured by heating a substance containing it, as red oxide of mercury, chlorate of potash, &c.; it is much more soluble in water than either nitrogen or hydrogen; it is colourless, inodorous, rather heavier than atmospheric air, its density being 1·105; it supports combustion and respiration, and to its presence the atmosphere owes these properties; it combines with almost all the elements, and forms substances bearing the general name of oxides: those which resemble potash, litharge, &c., are termed alkaline or basic oxides, these generally contain one equivalent of oxygen to one of base: another class are called acids, containing more than one equivalent of oxygen to one of base, as arsenious and arsenic acids; while a third class have neither basic nor acid properties.

Potassium is obtained by decomposing newly-made pure carbonate of potash, by means of charcoal. It has the metallic lustre of lead, is soft and malleable at 50°, but at 32° hard and brittle. Its specific gravity at 60° is 0·865. It becomes somewhat fluid at 70°, quite fluid at 150°, and at a red heat is converted into vapour. It combines rapidly with oxygen, and forms potash.

Sodium, obtained by decomposing soda, has the lustre of silver; is very soft and malleable at 60°, and retains these properties at 32°. Its specific gravity is 0·972. It fuses at 200°, and requires a higher temperature for its volatilization than potassium. It combines rapidly with oxygen, and forms soda.

Section III.

PHARMACEUTICAL OPERATIONS AND APPARATUS.

The operations of pharmacy may be arranged under two classes: —

I. *Operations which are purely mechanical.*

II. *Operations which are performed by chemical powers and agents.*

The first are intended for determining the weight and bulk of bodies, diminishing their cohesion, and separating their integral parts: the second are intended for separating the elements of bodies from one another, and for re-uniting these elements into new combinations.

I. PHARMACEUTICAL OPERATIONS PURELY MECHANICAL.

a. *Of the means of determining the weight and bulk of bodies.*

In pharmaceutical processes it is essential that the quantities of the substances employed be accurately ascertained; and for this purpose beams with scales, and various kinds of measures, must be provided. Several sets of beams and scales are necessary; one set for large weights, from one pound to one hundred weight or more; another for weights not exceeding five pounds; and a third for small weights under two drachms. A good beam should remain in equilibrium, both by itself, and when the scales are suspended to each extremity; the largest sets should be exact to within half a drachm; the second should be sensibly effected by two or three grains at most; and the smallest by the hundredth part of a grain. But a good balance will move with the difference of $\frac{1}{1000}$th of a grain, and indicate $\frac{1}{50000}$th of the weight which it is intended to weigh. Apothecaries and druggists, however, seldom require beams of such accuracy, and too often those which they employ are much injured by exposure to acid fumes, and from want of cleanliness. To preserve the delicacy of beams, they should be kept in very close cases, and not left suspended longer than is absolutely necessary; nor should they be overloaded.

Drugs are bought in the gross by *avoirdupois*, or, as it is now termed, *imperial weight*, which is the standard of most articles of merchandise; but for the composition of medicines, *troy weight* is directed to be used by the London and Edinburgh Colleges, and, until 1850, by the Dublin College also: now, however, the Irish College have ordered that the avoirdupois pound should be used, and they have subdivided this into ounces, drachms, and scruples

The following table exhibits the manner in which the apothecaries' or troy pound is divided, and the signs used in prescriptions, for denoting the different weights:—

A pound (*libra*), ℔	contains	℥ xij = 5760 grains.
An ounce (*uncia*), ℥	contains	ʒ viij = 480 —
A drachm (*drachma*), ʒ	contains	℈ iij = 60 —
A scruple (*scrupulus*), ℈	contains	gr. xx.
A grain (*granum*), gr.		———

The differences between the imperial weight, the standard of the empire, fixed in 1826, the avoirdupois pound, the troy and the apothecaries' pound, and their subdivisions, are exhibited in the following tables:—

1. Imperial or avoirdupois weight.

Ton.		*Cwt.*		*Stone.*		*Pound.*
1	=	20	=	160	=	2240
		1	=	8	=	112
				1	=	14

Pound.		*Ounces.*		*Drachms.*		*Grains.*
1	=	16	=	256	=	7000
		1	=	16	=	437·5
				1	=	27·34375

2. Troy weight.

Pound.		*Ounces.*		*Pennyweights.*		*Grains.*
1	=	12	=	240	=	5760
		1	=	20	=	480
				1	=	24

3. Apothecaries' weight.

Pound.		*Ounces.*		*Drachms.*		*Scruples.*		*Grains.*
1	=	12	=	96	=	288	=	5760
		1	=	8	=	24	=	480
				1	=	3	=	60
						1	=	20[1]

4. Avoirdupois weight (modified by the Dublin College)

Pound.		*Ounces.*		*Drachms.*		*Scruples.*		*Grains.*
1	=	16	=	128	=	384	=	7000
		1	=	8	=	24	=	437·5
				1	=	3	=	54·7
						1	=	18·22

Liquids are now ordered to be measured: and for this purpose the British Colleges employ measures derived from the imperial

[1] Tables of the method of reducing the subdivisions of the troy pound into decimals of the troy pound are given in the Appendix.

wine gallon, which is subdivided for medical purposes, in the manner exhibited by the following table, which shows also the symbols used for denoting the several measures: —

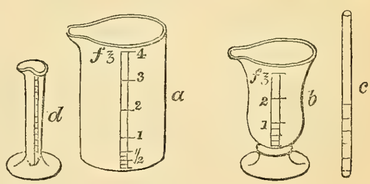
A gallon (*congius*), C	contains	O viij = 10 ℔ avoirdupois = 277·274 cub. inches = 76·800 minims.
A pint (*octarius*), O		f℥ xx = 9600 minims = 8750 grains.
A fluid ounce (*fluid uncia*), f℥		fʒ viij = 480 minims = 437·5 grains.
A fluid drachm (*fluid drachma*), fʒ		♏ lx = 54·7 grains.[1]
A minim (*minimum*), ♏		

Table of the proportions of the gallon used by the British Colleges.

Gallon.		*Pints.*		*Fluid ounces.*		*Fluid drachms.*		*Minims.*
1	=	8	=	160	=	1280	=	76·800
		1	=	20	=	160	=	9600
				1	=	8	=	480
						1	=	60

The London College introduced the minim measure as a substitute for the drop, the inaccuracy of which had been long experienced; as the fluidity and specific gravity of the liquid, the thickness of the lip of the phial, and even its degree of inclination, were all liable to vary the size of the drop; but by dividing the fluid drachm into sixty equal parts, a measure of bulk is obtained, which is as constant and uniform as the grain weight employed for solids.

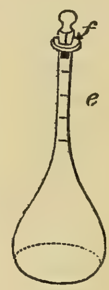
For measuring liquids, graduated glass measures of different sizes, *a*, *b*, are to be preferred; and for quantities under five minims a slender, graduated glass tube, *c*, open at both ends, or the measure *d* is to be employed. When the tube is used, the graduated end is to be inserted into the liquid to be measured down to the mark indicative of the quantity required; and the upper end being then closely covered by the finger, the tube retains the proper quantity of liquid, which again drops from it on raising the finger from the upper end. The small glass measure *d* is now pretty generally used instead of the tube. In extemporaneous prescriptions, the measures of a table-spoonful *cochleare majus*, and a tea-spoonful, *cochleare minimum*, are used when great accuracy is not required; the former being supposed to be equal to half a fluid ounce, the latter to a fluid drachm. The term *cyathum* is very indefinite, but it is usually supposed to be equivalent to a fluid ounce and a half.



[1] The weights refer to those of the measures of distilled water at 60° *F.*

Elastic fluids or gases are also measured in glass jars, or tubes hermetically closed at one extremity, and graduated by inches, with their decimals; but, in ascertaining the bulk of gases, the temperature of the atmosphere, and its density at the time, as indicated by the thermometer and the barometer, must be attended to; for if the former be above or below 60°, the mean heat of the air, or if the mercury in the barometrical tube be under or above 30 inches, corrections must be made by calculation relative to the degrees of temperature and pressure. For making the corrections, see the table in the Appendix.

The SPECIFIC GRAVITY of bodies, or peculiar weight of the same volume of different kinds of matter, is also necessary to be known in many pharmaceutical processes; and as the effects of acids and alcohol depend on the degree of their concentration, a knowledge of their gravity enables this to be correctly ascertained. The specific gravity of any substance is "the quotient of its absolute weight divided by its magnitude, or the weight of any determinable bulk of any body; and, as a standard for this purpose, the weight of a determinate magnitude of distilled water has been generally assumed as unity.[1] It is seldom necessary to determine the specific gravity of solids; but for ascertaining that of fluids various means may be employed. If a little ball of rock-crystal, for instance, suspended by a hair or a fine platinum wire, be weighed first in air, and afterwards in distilled water of the temperature of 60° Fahr., the weight lost by the ball is equal to the weight of an equal bulk of the liquid; so that, by repeating this operation in other fluids, and dividing its loss of weight in any other liquid by its loss of weight in water, the quotient is the specific gravity of the particular liquid.



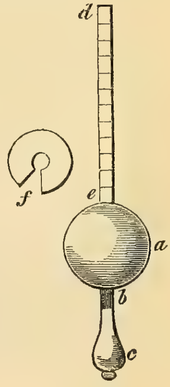
The specific gravity of liquids is very easily determined by the following simple method: — Take a small light bottle which stands firmly, *e*, and holds about a fluid ounce or two fluid ounces of water, and stop its neck by a piece of thermometer-tube very accurately ground; or a conical stopper with a notch in it, *f*. First weigh the empty bottle and tube; then fill it with distilled water at 60°, recently boiled, till the water rises a little into the bore of the tube, and weigh the whole, scratching the weight in grains on the bottle, and also the weight in grains of the empty bottle and tube. A bottle of this kind is now sold under the name of "*Thousand-grain bottle*," with a weight, which is an exact counterpoise to it when it is full of distilled water at 60°. By filling this bottle with any other fluid, and weighing it, the specific gravity of that fluid is ascertained by only calculating how much

[1] *Lavoisier's Elements of Chemistry.* — Trans. 376.

lighter or heavier it is than the same bulk of water.[1] Thus, if it be filled with spirit of wine, instead of weighing 1000 grains, as when it is filled with water, it will require 161 grains to be put into the scale with the bottle to restore the equilibrium, and hence, the sp. gr. of the spirit of wine is 0·839; if sulphuric ether be weighed, 270 grains will be required, making the sp. gr. of ether 0·730; but, if sulphuric acid be used, 875 grains will be required to be added to the 1000 grains' weight in the opposite scale, and consequently its sp. gr. is 1·875.

A specific gravity bottle may be readily prepared from a flask which contains, when filled about half way up the neck, 1000 grains of water; an exact counterpoise to the bottle should first be made; the counterpoise and a 1000 grain weight should then be placed in one scale of a balance, and the flask in the other; distilled water at 60° Fahr. is then to be poured into the flask, until the opposite scale is exactly balanced; the flask is then taken out, and a mark made with a file at the height at which the water stands—it is now ready for use: to take the specific gravity of a liquid it is only necessary to fill the bottle up to this mark, and making use of the counterpoise as before, the weight necessary to balance the bottle, with the contained fluid, will be the specific gravity required.

In ascertaining specific gravity, the substances should be brought by calculation to the temperature of 60°, if the thermometer be above or below that point at the time of performing the experiments; and the gravities should always be expressed according to their relation to distilled water. Although this is the method generally employed in philosophical and pharmaceutical operations, yet it is necessary to observe, that the strength of spirits, according to the excise laws in this country, is estimated by the proportion they contain of a standard spirit, termed hydrometer proof, which consists of 40 parts of pure alcohol and 51 of water. Sikes's hydrometer is the one employed by the Excise.[2] The strength of spirits stronger than proof, or *over proof*, is ascertained by the bulk of



[1] *Aikin's Dictionary of Chemistry*, ii.—*Appendix*.

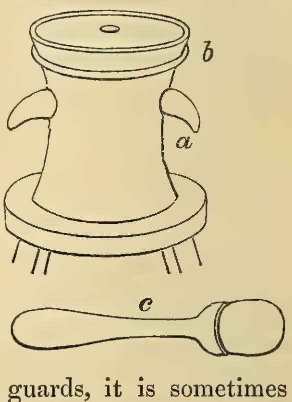
[2] Sikes's hydrometer is a hollow brass ball, *a*, to which is attached the loaded stem, *b c*. Into the copper part of the ball the flat stem, *d e*, is inserted, which is graduated into eleven equal parts, each of which is divided into two. Eight circular weights similar to *f* are so adjusted as to be fixed upon *b c*, by which the instrument is adapted to measure the specific gravity of liquids heavier than water.

water required to reduce a given bulk of the spirits to the specific gravity denominated proof, on Sikes's hydrometer; and the strength of weaker spirits, or *under proof*, is estimated by the quantity of water it would be necessary to abstract to bring the spirits up to proof. Thus, if 20 gallons of the spirit require the addition of one gallon of water to bring it to proof, the spirit is said to be *one* to *twenty over proof;* and if, from the same quantity of spirits, one gallon of water must be abstracted to bring it to proof, it is said to be *one* in *twenty under proof;* and so on.

b. *Of the mechanical division of bodies.*

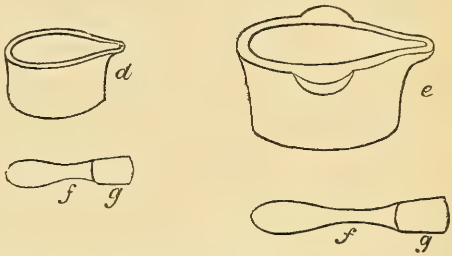
The cohesion of solid bodies often opposes an obstacle to their immediate chemical combination with other substances, and their medicinal action in the stomach; and therefore the following preliminary mechanical operations are instituted for overcoming to a certain degree that power, and separating the integrant particles of bodies, or reducing them to the state of powder. These are denominated pulverization, trituration, levigation, and granulation.

1. *Pulverization* is that process by which friable and brittle solid bodies are reduced to powder. It is generally performed in mortars by means of pestles. These are made of various materials of brass, iron, marble, granite, glass, agate, and porcelain, or of Wedgwood's ware, according to the nature of the substances for the pulverization of which they are intended to be used: it being requisite that the materials of which pestles and mortars are made be such as to resist both mechanical force and the chemical action of the substances they contain. Thus, a mixture containing any astringent matter is turned black, if rubbed in an iron mortar; and acid substances act upon one made of marble.



Mortars are required to be of various sizes. The largest size is usually made of cast iron, *a*, fitted with a wooden cover, *b*, perforated to admit the pestle, but close enough to prevent the finer and lighter parts of the substances from flying off, and to defend the operator from disagreeable and noxious matters, such as aloes, ipecacuanha, &c. This may be more completely attained by tying closely round the mouth of the mortar, and round the stalk of the pestle, *c*, a large piece of leather, so pliable as to admit the free motion of the pestle. But notwithstanding these guards, it is sometimes necessary for the operator to cover his mouth and nostrils with a wet cloth, and to stand with his back to a current of air, that the particles which arise may be carried from him, when very acrid

friable matters, such as euphorbium or Spanish flies, for instance, are to be powdered. To lessen the labour, the pestle is often attached by a cord to the end of a flexible wooden beam, placed at a considerable height horizontally over the mortar, the elasticity of which elevates the pestle after each stroke is made. For lighter purposes, brass and bell-metal mortars are sometimes used: but as, in the pulverization of every hard body, the mortar also is worn by the operation, these mortars are improper for pharmaceutical purposes. The most useful mortars for smaller articles are those of porcelain and Wedgwood's ware, *d*, *e*, as they are smooth, hard, and resist the action of any chemical re-agent. The handles, *f*, of the pestles are made of wood, and the heads, *g*, of the same material as the mortar. These mortars, however, are not adapted for the pulverization of very hard bodies.



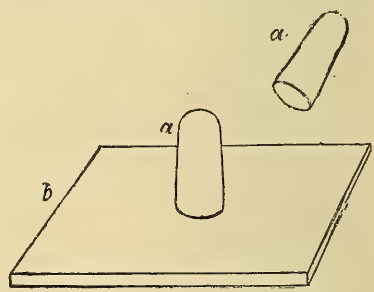
Of whatever materials mortars are made, they should be internally, at bottom, of the form of a hollow hemisphere, and their sides should have such a degree of inclination as to make the substances fall back to the bottom every time the pestle is lifted. The operation, however, is retarded when too great a portion of the ingredients falls under the pestle; hence a large quantity of any substance should not be put into the mortar at a time, and the finer parts should be from time to time removed.

Vegetable matters require to be dried before they can be pulverized; and wood, roots, and barks should be previously cut, chipped, or rasped. When roots are very fibrous, as those of ginger, for example, it is advisable to cut them diagonally, which prevents the powder from being full of hair-like filaments. Resins and gum resins, which soften in a moderate temperature, or in warm weather, should be powdered in cold weather, and only gently beaten, to prevent them from running into a paste instead of forming a powder; and when the powdered substance is intended to be dissolved in any menstruum except a pure alkali, the pulverization is much facilitated by mixing them with a portion of clean, well-washed white sand. The pulverization of camphor is assisted by the addition of a few drops of alcohol; sugar is the best addition to aromatic oily substances, as nutmegs, mace, &c.; and to the emulsive seeds some dry powder must be added, without which they cannot be reduced to powder. Metals which are scarcely brittle enough to be powdered, and yet are too soft to be filed, as zinc, for instance, "may be powdered while hot in a heated iron

mortar; or metals may be rendered brittle by alloying them with a small quantity of mercury[1];" but as metals are not required to be reduced to the state of very fine powder, for pharmaceutical purposes, these processes are seldom performed.

2. *Trituration* is intended to produce the same effect as pulverization, but in a greater degree. It is performed by a rotatory motion of the pestle, either in the common mortars of glass, agate, or Wedgwood's ware, or in flatter mortars made of the same materials. On a great scale this operation is performed by means of large rollers of hard stone, which turn upon each other as in corn-mills, or by one vertical roller, turning upon a grooved or flat stone. The fine powders kept in the shops are generally ground in this manner; but there appears to be an error in reducing vegetable matters to the state of impalpable powder: for in this state, both during the process of grinding and afterwards, the air and light act powerfully upon them, and produce changes, which, although they be not well understood, yet appear to alter the medicinal properties of the substances.

3. *Levigation* is a process similar to trituration, except that the rubbing is assisted by the addition of a liquid in which the solid under operation is not soluble. Water or spirit of wine is usually employed, and occasionally viscid and fatty matters, as honey and lard. The substance to be levigated is spread on a flat table of porphyry, or some other hard stone, *b*, and is then bruised and rubbed with a muller of the same materials, either of a cylindrical shape, as *a*, *a*, or a portion of a large sphere. A thin spatula of ivory, horn, wood, or iron is employed to bring back the materials from the edges of the table, to which the operation of the muller continually drives them. Earths and some metallic substances are thus prepared.

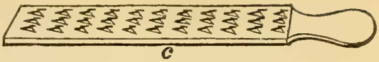


4. *Granulation* is employed only for the mechanical division of metals and of phosphorus. It is performed by melting the substance, and either stirring it briskly until it is cold, or pouring it, in the melted state, into water, and stirring or agitating it till it cool. For the granulation of phosphorus, the latter process must be employed; it must be melted under water, and a little alcohol added, before the whole is well shaken, the agitation being continued until the phosphorus solidifies in granules.

Substances are also reduced to the state of coarse powder by

[1] *Lavoisier's Chemistry.* — Trans. 437.

rasping and filing; and softer vegetable bodies are converted into a pulp by means of the grater, *c*.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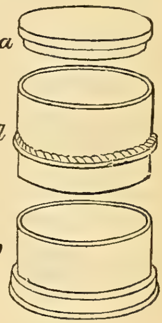
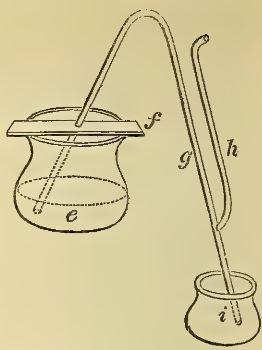
MECHANICAL SEPARATION.

The parts of substances, which have been pulverized, may be separated from each other by different mechanical means; as *sifting, washing*, or *elutriation;* and, under other circumstances, *filtration, expression, despumation.*

1. *Sifting.* The particles of the powders obtained by the longest and most accurate pulverization and trituration are still of very unequal degrees of fineness, and therefore require to be separated, the finer from the coarser, by the operation denominated sifting. For this purpose sieves are employed, made of iron wire, or of hair cloth, or of gauze. These permit the finer particles to pass through them, and leave the coarser to be again submitted to the pestle; and thus by degrees the whole assumes an uniform fineness. The simple sieve is a broad wooden hoop, with a cloth of one or other of the above textures stretched over it in the manner of the parchment of a drum. The compound sieve, which is more employed, consists of the simple sieve, *b*, with a deeper rim, *a*, a lid covered with leather, and *d*, a receiver, with leather stretched across one end, and made sufficiently wide to admit the lower portion of the sieve to enter and fit tightly within it. When these are put together, the finest powders may be separated by them without any loss or inconvenience to the operator. Three or four different receivers, one above another, may be used to obtain powders of different degrees of fineness.

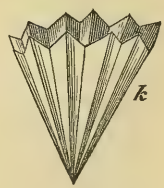


2. *Washing*, or *Elutriation*, is intended for separating the finer parts of powders prepared by trituration or levigation, which are not acted upon by water. The powdered substance is mixed with a large quantity of water, and briskly stirred, so as to diffuse it pretty equally through the fluid, which retains the finer particles suspended for a short space of time, and permits the coarser to settle to the bottom. The liquor, still containing the finer particles suspended, is poured off from the sediment; and by allowing it to remain at rest for a sufficient length of time, it deposits the fine powder, from which the clear water is separated, either by carefully decanting it, or, if the sediment be very light, so as to be easily disturbed, by drawing it off through the glass syphon, *g*, the longer limb of which being plunged into the vessel containing the fluid till it nearly touches the subsided powder, where it is supported by



the board, *f*, placed on the mouth of the vessel, *e*, and the air sucked from it by means of the arm, *h*, the whole of the supernatant fluid is drawn off into the vessel, *i*, and the powder left in a fit state to be dried.[1] The coarser particles first separated may be again levigated, and the elutriation repeated. Chalk and some metallic matters are thus prepared; and the process may likewise be employed for separating substances of different degrees of specific gravity, although of the same degree of fineness.

3. *Filtration* is intended for separating fluids from solid bodies suspended in them. Filters may be regarded as kinds of sieves; and are generally made either of very fine and close flannel, or of linen, or of unsized paper formed into a conical shape, through which the liquid percolates clear, while the solid is collected at the apex of the cone, which is inverted. When the quantity of materials is large, and the solid suspended in the fluid is not in the state of very fine powder, flannel or linen bags are to be preferred, as performing the process more quickly than paper. These are generally made in a conical shape, with the mouth stretched on a hoop or frame supported upon a wooden stand. When the solid residue is the part to be preserved, flannel filters may be used; but when the filtered liquor is the valuable product, linen is preferable, as it absorbs less of the fluid, which is obtained, also, in a more limpid state. The cloth must be well cleaned after every time that it is used, to prevent any thing remaining to injure subsequent operations. For small processes, unsized paper is the best material for forming filters. A square piece of this paper, of a size proportionate to the quantity of the substance to be filtered, is taken, and first doubled from corner to corner into a triangle, which by a second doubling forms again a smaller triangle, and this, being cut at the margin and opened, constitutes a paper cone, *k*, which is to be supported in a glass funnel, *l*, before the liquor is poured into it.



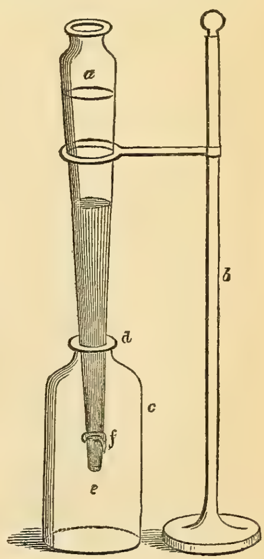
Funnels are made of tin, or of Wedgwood's ware, or of glass; but only the two latter should be used in the laboratory. Those which are ribbed are preferable, as the paper adheres so

[1] The fluid may also be drawn off by means of wet cotton or worsted threads, having one end in the fluid, nearly touching the precipitate from which it is to be separated, and the other hanging over the side of the vessel, below the plane of the fluid in it.

closely to the sides of smooth funnels as nearly to prevent the filtration from proceeding, unless pieces of straw, or quills, or thin glass rods be arranged round the inside, so as to form an unequal surface for the paper to rest upon.

In most instances, the first portions of the fluid that pass through a filter are turbid, and therefore require to be poured back again, sometimes repeatedly, into the filter, until the pores of the filter are sufficiently obstructed to permit the most limpid part only of the liquor to pass. In cases where the solid residue is small, and it is requisite to collect the whole of it, it is useful to have a small glass tube, drawn out to a fine capillary point at one extremity, and blown to a globe in the centre; by filling which with distilled water, and putting the larger end into the mouth, the force of the breath can direct a small but strong stream of water round the sides of the filter, which will wash down to its bottom all the minute particles of solid matter lodged on its sides.

The concentrated acids and the alkaline solutions act too powerfully on the materials commonly employed for filters, to be filtered in the ordinary way; and therefore, when it is required that they should be filtered, which is not often the case, they are passed through strata of siliceous matter, arranged in a glass funnel, in the following manner:—An irregularly-shaped pebble is first dropped into the throat of the funnel; then a layer of pieces of quartz, or broken flint-glass, is placed over it; and, lastly, a thick stratum of coarsely-powdered glass, or of well-washed white sand, covers the whole. The substance to be filtered is poured gently on the surface of the sand, and soon passes through it and the substrata, leaving the impurities behind.



4. *Percolation* is a species of filtration which is employed for making tinctures. It is performed by means of an oblong funnel, *a*, which may be made of glass or of block tin; and it may be incased with another terminating a few inches from the top, and as many from the bottom, for holding hot water in operations in which the aid of heat is required. For ordinary purposes, the percolator, *a*, made of glass, may be supported by a brass stand, *b*, and the smaller extremity inserted into a wide-mouthed bottle, *c*, which it should only loosely fit, to enable the air to escape. The materials to be acted upon are to be rubbed up with an equal bulk of pure siliceous sand, and moistened with the solvent intended to be used; then put into the percolator, over the

lower orifice of which, *e*, a piece of calico, *f*, should be previously tied; lastly, the fluid, whether spirit or alcohol, must be poured over the materials, and the superior opening slightly stopped with a cork. By this method of operating, as a particle of sand is interposed between each particle of the materials, the spirit, in passing through, acts upon every side of every particle, and thus carries downwards all the soluble matter which it contains. Tinctures which, in the ordinary mode of maceration, require from seven to fourteen days to be perfected, are made by the percolator in as many hours. The whole of the tincture is obtained by pouring over the materials some water, towards the conclusion of the process: the water drives before it the spirit, and remains in the percolator, if not in too great a quantity.

5. *Expression* is employed for obtaining the juice of fresh vegetables, and the unctuous vegetable oils. The subject is first bruised or coarsely ground, then enclosed in a hair-cloth bag, and subjected to violent pressure between the plates of a screw-press. The bags should be nearly filled; and the pressure should be gentle at first, and gradually increased.

Vegetables, in general, intended to be expressed, should be perfectly fresh, and cleansed from all impurities; and should be submitted to the press as soon as they are bruised, as the bruising disposes them more readily to ferment; but subacid fruits yield more juice, and of a finer quality, when the bruised fruit is allowed to stand for some days in an earthen or a wooden vessel. It is necessary to peel oranges aud lemons before pressing them, to prevent the essential oil which their rind contains from mixing with the juice; and to some vegetables, which are not very juicy, the addition of a little water is requisite.

For expressing the unctuous seeds, in order to obtain the oil which they contain, iron plates are employed; and the bruised seeds should be previously exposed in a bag to the stream of boiling water.

6. *Despumation* is employed to clarify fluids which are so thick and clammy as not to be able to penetrate through the substances of which filters are made, without some previous preparation. For this purpose it is sometimes required only to heat the liquor, which then throws up a scum that is to be carefully removed; but more frequently it is necessary to clarify the liquid with the white of egg. When the substance is not spirituous, as syrup for example, the albumen which is mixed with the fluid coagulates when it is boiled, and, entangling the impurities of the fluid, rises with them to its surface in the form of scum; but spirituous liquors may be clarified with isinglass without the assistance of heat, the alcohol coagulating the isinglass, which forms a scum, and, descending to the bottom of the vessel, carries with it all the impurities. In both instances the despumation is a species of filtration. Some expressed juices are clarified by the simple addition of any vegetable acid.

Besides the above methods of mechanically separating the parts of substances from one another, fluids of different specific gravities, mixed together, but not capable of remaining mixed, are separated by means of the *separatory funnel*, *m*. This instrument is chiefly used for separating the volatile oils from the water with which they are mingled during their distillation. The funnel is first stopped at the bottom, and then filled with the mixed fluids, the heaviest of which gradually subsides into the narrow part below; and when the cork at the bottom is taken out, and the stopper above a little loosened, it flows out; by which means the lighter is easily obtained in a separate state. Some of the volatile oils are heavier, others lighter, than water, but both can be thus separated with equal facility.

m

II. CHEMICAL OPERATIONS.

The operations of Pharmacy, which are strictly chemical, may be arranged in three classes.

a. Operations which produce changes in bodies, separating the constituents, without any obvious decomposition.

b. Operations in which changes are produced by the chemical action of one set of bodies upon another, or attended with obvious decomposition.

c. Operations in which the oxidizement and the deoxidizement of bodies are effected by means of a very high temperature.

a. Of the operations which produce changes in bodies without any obvious decomposition.

These changes are effected—

1. By Caloric—inducing - -	Liquefaction.
	Fusion.
	Evaporation.
	Exsiccation.
	Distillation.
	Rectification.
	Concentration.
	Sublimation.
2. By water and other fluids - -	Solution.
	Lixiviation.
	Maceration.
	Digestion.
	Infusion.
	Decoction.
	Extraction.
3. By other chemical agents - -	Coagulation.

1. *Operations in which the changes are effected by caloric.*

Liquefaction is that operation by which certain bodies, when exposed to a moderate heat, are rendered fluid, after passing through several intermediate states of softness. This is owing to the absorption of caloric and its becoming latent, combined, or fixed. The quantity of caloric absorbed varies: water absorbs 140°; spermaceti, 145; sulphur, 143·7; bees' wax, 175; lead, 162; zinc, 494; and so on. During the liquefaction much cold is produced. Fat, lard, wax, resin, and many other similar bodies, undergo liquefaction; which is, therefore, employed in pharmacy to facilitate the combination of these bodies in the formation of ointments. The temperature at which liquefaction takes place is termed the melting point. It is always the same, in the same body. The best vessels for conducting the process of liquefaction are earthenware pans.

Fusion is a modification of liquefaction, but differs from it in the sudden change from the solid to the fluid state which those bodies which are liable to it suffer on exposure to heat. There are no intermediate states of softness; but the fusible body, when heated to a certain point, immediately assumes the fluid form. This point differs very considerably in different solids; but, in general, simple substances are less fusible than compounds; and some of the simple earths cannot be fused without the addition of some other substances to promote their fusion. These are generally saline bodies, and are denominated *fluxes.*

Fusion, which may take place without changing the nature of the fused matter, is intended as a mean of promoting chemical action, and of decomposing bodies. It is, however, generally confined to the metals, which are extracted from their ores, and afterwards smelted and alloyed by it. It is a species of operation occasionally employed in pharmaceutical processes.

Fusion is usually performed in crucibles[1], the best of which are made of very pure clay, or potter's earth. Those formed of common clay, with calcareous or siliceous earth, are easily vitrified, and then melt. The Hessian crucibles are composed of better clay and sand, and when good, stand the fire very well; as do also Wedgwood's crucibles; but they are apt to crack when suddenly heated or cooled,—a circumstance, however, which may be remedied by using a double crucible, and filling the interstice with sand, or by coating the crucible with a paste of clay and sand. Crucibles formed of black lead resist very sudden changes of temperature; but they are destroyed if nitre be melted in them; and even a current of air acting upon them whilst they are hot destroys them.

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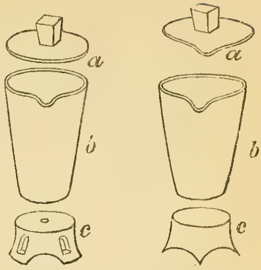
[1] The name crucible was derived from the alchemists having stamped upon the vessel the figure of the Cross.

Crucibles are made of various forms, three-cornered or round, *b*, *b*, and fitted with covers, *a*, *a*. The lids may be luted on, if necessary, with a mixture of clay and borax. Those crucibles which are of uniform thickness, which have a reddish brown colour, without black spots, and a clear sound when struck, are to be preferred.



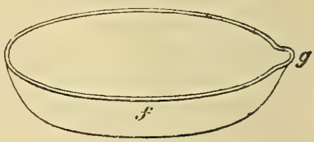
In order to expose the lower part of a crucible to the utmost intensity of heat, and to prevent it from cracking by the draught of cold air which would be directed upon it, were it to be placed directly upon the grate of the furnace, it is usually raised an inch above it, upon a small stand, *c*, *c*, either solid or hollow. Dr. Kennedy considers that an inch above the grating of a furnace is the hottest part of the furnace.

Crucibles are also made of cast-iron, of fine silver, and of platinum. The first, however, are destroyed when saline substances are melted in them; and, when made red-hot in a current of air, are apt to suffer oxidation; but in other respects they are durable, and can sustain sudden alternations of heat and cold without cracking. Some of the metallic crucibles combine many of the best qualities necessary for this set of instruments; particularly those of platinum, which, however, are too expensive for ordinary use.

Evaporation is the dissipation of a liquid by means of heat, so as to recover a solid body from its solution in a fluid. It is employed in pharmacy, generally, with the view of obtaining, in a separate state, any crystallizable or solid substance which may be combined with water, or some other evaporable fluid. Thus, by exposing an aqueous solution of a salt to a certain degree of heat, the caloric which combines with the water renders it volatile, and disperses it in the form of a vapour; while the particles of the salt, being brought nearer to each other, and within the sphere of their mutual attraction, re-unite, and the salt is obtained in its concrete state. In the open air evaporation is confined to the surface of the liquid, and is therefore quicker or slower in the ratio of the extension of the surface. Evaporation proceeds most rapidly when a current of air is made to move over the fluid, for in a calm air the vapour rests upon the surface of the fluid, and impedes the process by its pressure. This process differs from spontaneous evaporation, in which air is the principal agent, the liquid being diminished in quantity and dissipated in that fluid, independent of the action of caloric; whereas evaporation is not carried on by the air, but only in proportion to the quantity of caloric which combines with the fluid, or the degree of heat at which the process is conducted. As the fluid which is dissipated is entirely lost, and sacrificed for the sake of the

fixed substance with which it was combined, evaporation is only employed where the liquid is of little value, such as water; but where a solid is to be recovered from a more valuable liquid, as alcohol, for instance, the process of distillation is employed.

For small processes, very good evaporating dishes are made of the bottoms of broken retorts and matrasses, which may be cut smooth round the edges by means of a hot iron or ring, *d*, with a wooden handle, *e;* and thus they are converted into semiglobular basins.[1] The best evaporating dishes, however, are those made of porcelain, as Wedgwood's, Berlin, and Meissen ware, and sold in assortments, the largest of which is capable of holding eight or ten pints. They are flat-bottomed, shallow vessels, *f*, with a lip, *g*, glazed in the inside; and thin, but of a dense hard texture. They will bear to be heated to the boiling point over a clear hot fire: but are apt to crack when a flame is allowed to play on them, or when the liquor is boiled to dryness, at the moment when the last drop of fluid is expelled, unless the fire be much lowered. It is preferable, therefore, when glass or earthenware vessels are employed, to apply the heat by the medium of sand; or if a still more moderate heat be necessary, by means of boiling water, over which the evaporating dish should be placed. The first is denominated a *sand bath;* the second, a *water bath;* but for processes on a large scale, shallow iron pots or leaden troughs are used, to which the fire is directly applied.



Exsiccation is a variety of evaporation, producing the expulsion of moisture from solid bodies by means of heat. It is generally employed for depriving salts of their water of crystallization. They are exposed to the action of a fire in an iron ladle or pot, or in a glass vessel; and after dissolving, as they are heated, in the water they contain, or undergoing what is termed the watery fusion, the water boils; and, evaporating, leaves the salt in the form of a dry mass. When the substances to be exsiccated are liable to decomposition in a temperature above 212°, as is the case with some of the compound oxides, and the alkaloids, the process must be conducted by the heat of a water bath. In delicate operations, exsiccation is performed in vacuo. This is one of the improvements of modern times, for the formation of extracts.

Distillation differs from evaporation only in the circumstance,

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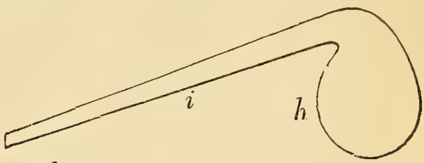
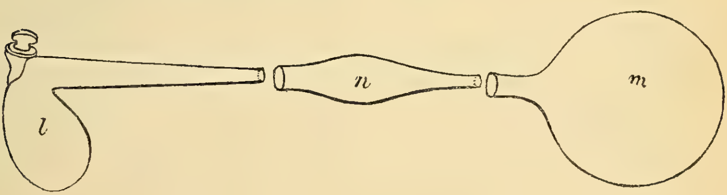
[1] The iron ring for this purpose is made red-hot in the fire, then put upon the matrass which is to be cut; and, when the glass is sufficiently heated, by throwing on it a little cold water, it will generally break exactly at the circle heated by the iron ring.

that the vapour or volatile matter is elevated, to be condensed in separate refrigerated close vessels, and preserved. The mode of conducting the operation, and the regulation of the heat, differ according to the nature of the substances operated on.

The simplest distilling apparatus for smaller processes is the *Retort* and the *Receiver*. The former consists of a nearly globular body, *h*, with a long gradually tapering beak, *i*, which is bent nearly at a right angle with the body of the vessel. This is the simplest kind of retort; and if the materials to be distilled be liquid, they should be poured into the body of the vessel by means of a very long funnel, *k*, which, by reaching completely into it, prevents anything from trickling down the sides of the beak.

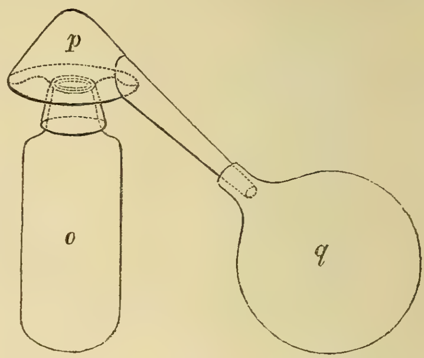


In withdrawing the funnel it is necessary to keep it applied to the upper part of the beak, that the drop hanging from it may not touch the inside of the neck. For nicer purposes the tubulated retort, *l*, is to be preferred, The bottom of either kind should be very thin, and of a uniform degree of thickness, so as to bear the sudden application of heat from an Argand lamp, or even from a naked fire. The receiver, *m*, should be larger than the retort, and of a globular form, so as to allow of a large surface for cooling the condensing vapour ; and it may be either jointed directly to the retort, by the neck of the latter passing into it, or indirectly by the intervention of a third piece, *n*, denominated an *adapter ;* and in either

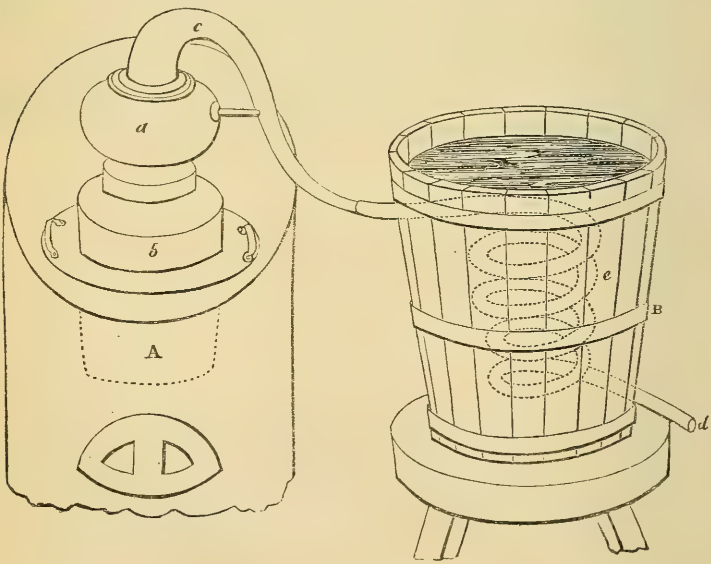


case the joinings are usually protected by lutes. When the substance to be condensed is of a very volatile nature, as ether, for instance, the receiver must be artificially cooled, and kept during the whole process at the temperature of the atmosphere, either by surrounding it with ice or snow, or allowing water to trickle slowly over it, brought down from a trough placed above the receiver, by means of worsted threads. The constant evaporation which the water suffers on the surface of the receiver, keeps it at the requisite degree of temperature for condensing the ether. Both the retort and the receiver may be tubulated.

Sometimes, instead of the retort and receiver, the stone-ware cucurbit, *o*, with its capital, *p*, and receiver, *q*, is used. It is necessary, occasionally, to coat the retort and the latter-mentioned vessels with sand and clay, to enable them to sustain a high temperature, and the sudden alternations of heat and cold to which they are liable in common operations. By these kinds of apparatus, acids, and other substances which arise from chemical decompositions, aided by heat, are distilled; and the process is named distillation *per latus;* but if the products be highly volatile, or of a gaseous nature, the pneumato-chemical apparatus, to be afterwards described, is required.



For the preparation of alcohol, and of distilled waters, the common still is employed. It consists of two parts—the boiler, *b*, and the head or capital, *a*. The boiler, which is the part to



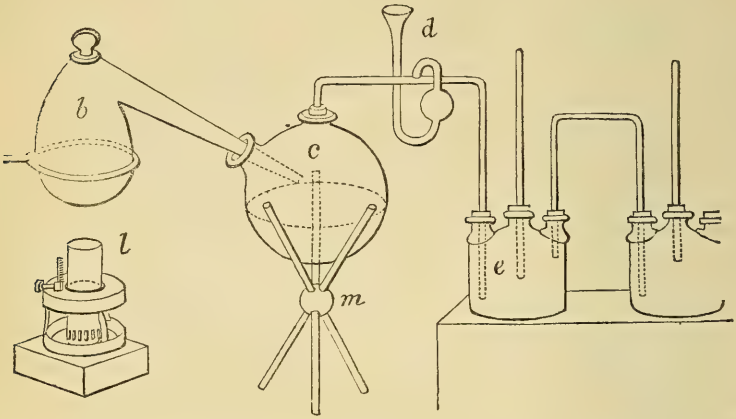
which the fire is applied, and contains the materials, is generally of a cylindrical shape, and may be sunk into a furnace, or immersed in a water bath, A, when the temperature requires

to be nicely regulated. The *head* or *capital* is a large hollow globe, the upper part of which is drawn out into a tapering pipe, *c*, bent to a curve or arch, and terminating in the serpentine, or worm, *e*. These parts are generally made of copper; but the *worm* is a long pewter pipe, of a decreasing diameter, which winds in a spiral direction obliquely through a deep tub, B, filled with cold water. The body, head, and worm require to be luted together; but in general slips of paper, dipped in flour paste, or pieces of wet bladder, are sufficient for this purpose. In this apparatus, the vapours are raised into the *head*, whence they pass into the *worm*, where they are condensed, and issue in drops from the lower end of the pipe, *d*; but the boiling never rises in temperature, owing to the vapour carrying off the excess of caloric, and giving it up again to the water in the refrigeratory. By degrees the water in the refrigeratory therefore becomes warm, and requires to be renewed; and hence the necessity of the tub being furnished with a stop-cock, by which the heated water may be drawn off, and fresh cold water supplied, without disturbing the apparatus. As in this species of distillation the vapour ascends before it is condensed, it is named distillation *per ascensum*. When a greater heat than 212° is required, chloride of calcium may be dissolved in the water of the bath, by which means the heat is raised to 270°; or steam under pressure may be used with the same intention.

In some cases, as in the distillation of several volatile oils, the vapour, instead of passing laterally, or ascending, is forced to descend. To produce this effect, a plate of tinned iron is fixed within any convenient vessel, so as to leave a space beneath it; and the materials to be distilled being laid upon this, they are covered by another plate accurately fitted to the sides of the vessel, and strong enough to support the fuel which is burnt upon it. By this means, the volatilized matter of the materials, under the fire, is forced into the lower cavity of the vessel, and there condensed. This mode of distilling is denominated distillation *per descensum*.

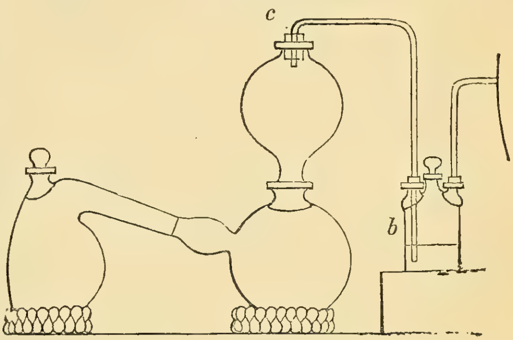
In many processes, a large proportion of the vapours which are extricated is incondensible; and unless there were some means by which these could escape, the apparatus would be burst in pieces. To prevent accidents, therefore, a small hole was generally left, either in the joinings of the vessels, or in the receiver, which could be kept shut, and occasionally opened when the quantity of confined vapour was supposed to be such as might endanger the rupture of the vessels. By this contrivance, however, much condensible vapour escaped, and a large proportion of the products of the distillation was necessarily lost. This defect of the old apparatus was first attempted to be remedied by Glauber, whose hints were improved by Woulfe, the inventor of the apparatus

now commonly employed. It consists of a retort, *b*, generally tubulated, in which the materials are heated by a lamp, *l*; a receiver, *c*, supported by a stand, *m*, to detain any part of the

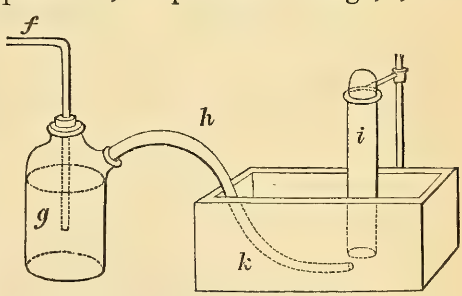


product which is condensible by cold; and a bent tube, proceeding from the receiver to the bottom of the bottle, *e*, with two apertures, and which is about half full of water. Several bottles, however, are generally employed; and these, being placed side by side, are connected with one another by means of bent tubes, one limb of each proceeding from the top of the bottle immediately preceding, and the other plunging to the bottom of the liquid of the bottle next in order. The joinings of the apparatus are all made air-tight, except the opening of the last bottle farthest from the retort, so that any vapour which escapes must have passed through the liquid in the whole series of bottles, and left all its condensible matter, before it can escape. One inconvenience, however, attends this apparatus, when it contains no other parts than the above; which is, that after the distillation, as the retort cools, a vacuum is produced in it and the first receiver, which induces a suction or absorption from the other receivers through the bent tubes, and a retrogade motion of the liquid contained in them takes place through the whole apparatus; so that the products are mixed, unless the operator be on the watch to separate the retort and receiver the moment the liquor begins to rise in the bent tube between the receiver and the first bottle. The best contrivance for remedying this defect, is the tube of safety, invented by *Welter*, and represented at *d*. It is a bent tube, with a bulb blown in that part of it which lies between the upper and lower flexure; and a small funnel at the top. This tube is sometimes used as a stopper to the tubulure of the retort, or to a separate opening in the receiver; or, as is represented in the cut, it is cemented into the

tube passing from the receiver to the first bottle. When it is to be used, a little mercury is dropped into the funnel, so as to occupy the space of the tube which lies between the two lower flexures. The mercury excludes the external air during the distillation; but as soon as the vacuum is formed by the cooling of the vessel, the mercury is forced by the pressure of the atmosphere into the bulb; and not being in sufficient quantity to fill it, the external air passes by it in the bulb, and rushes into the apparatus; by which means the vacuum is filled up, and the absorption of the liquor prevented. Various modifications of this have been suggested; but the best is the invention of M. Pepys. It consists of a globular or rather pyriform vessel, *c*, with which the receiver is surmounted, and into which it is accurately ground. This is furnished with a glass valve, which allows gas to pass freely into it from the receiver, but prevents the water which it contains from falling into the receiver. From this a common tube rises, to connect the tubulated receiver, *b*, as in the former apparatus.

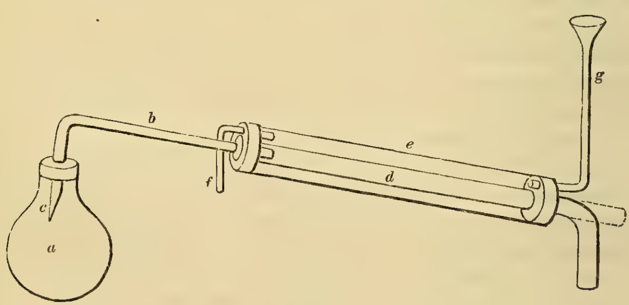


In chemical operations, when the gases which are separated during a process are to be preserved, the pneumatic trough, *k*, with its inverted jar, *i*, under which the curved tube, *h*, proceeding from the bottle, *g*, opens, is attached to Woulfe's apparatus. The construction of the trough differs according to the nature of the fluid with which it is filled. If water be employed, the trough may be of stone ware, or of tinned iron, well japanned, and of an oblong or a circular shape. It may be about 18 inches long, 14 broad, and 8 inches deep; with a shelf of the same materials, which should extend entirely across the trough, and have two small holes in it, to convey the gas into the inverted jars set upon it; and two larger holes, to receive two bottle supporters. This trough should be nearly filled with water, and the jars intended to hold the gas should be also filled with the same liquid, and inverted; so that,



when placed upon the shelf, the water in the trough may ascend about half an inch up their sides, which enables them to retain either water or gas. If mercury be employed, which is essential when the gases to be extricated are absorbable by water, the trough may be made of some hard wood, as mahogany, or of marble. It is not required to be so large as the trough for water, and one part only need be sunk; the shelf should be on each side of this part, which is called the well; and it is useful to have an iron or brass stem, supporting a semicircular clip, fastened into the substance of the trough, to support the jar when it is filled with mercury and inverted. By this apparatus, any gases given out during distillation may be collected and preserved; but this is a circumstance, in pharmaceutical operations, which is attended to more with the view of guarding the operator against the effect of noxious gases, than of preserving gases for examination.

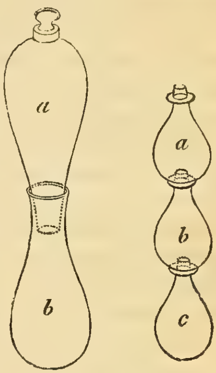
Rectification is the repeated distillation of any product obtained by distillation, when it is not perfectly pure. This second operation is carried on at a lower temperature, so that the more volatile parts only are raised, and pass over into the receiver, leaving the impurities behind. When the fluid is simply rendered stronger, as in the case of alcohol, by bringing over the spirit, and leaving behind the superfluous water, the operation is named *dephlegmation* or *concentration*. The process is called *abstraction*, when the liquid is distilled off from any substance; and *cohobation*, when the product is redistilled from the same materials, or from a fresh parcel of the same materials. When alcohol is to be procured from spirit at or only a little above proof, dried carbonate of potassa is put hot into the spirit, and allowed to remain at rest for several hours. When this solution is distilled, the alkali retains the water, and the alcohol only passes over. When small quantities of alcohol are required to be strengthened, or ether is required to be rectified, the best apparatus is a flask, *a*, with the addition of Liebig's refrigatory,



which consists of a tube, *b*, with an oblique termination, *c*, a little below the cork by which it is fitted into the flask, *a*; whilst the

opposite end passes into the glass tube, *d,* which is encased in a metallic or brass tube, *e,* twice the size of the former. Into this tube, which is fitted to the inner one by means of perforated corks, is affixed a third tube, *f,* small and bent at a right angle, and a funnel, *g.* When water is supplied to the outer tube, through the funnel, it fills the intervening space over the inner tube, and flows out at *f,* whence it is directed into a proper vessel placed below. In this manner the tube, *d,* is kept constantly cool, and the distillation proceeds with great rapidity.

Sublimation is a species of distillation in which the product of the volatilization is condensed in a solid form; but as this condensation takes place at a higher temperature than that of a watery vapour, a much more simple apparatus is required. The process is conducted sometimes in a crucible with a cone of paper or another crucible inverted over it, in which the product is condensed: and as in this case it is light and spongy, the sublimate was formerly denominated *flowers.* For other matters which are less volatile, a cucurbit and capital, or a flask or phial, are employed, and sunk about two thirds in a sand bath. The aludel, *a, a, b, b, c,* which may be extended to any number of vessels, is generally used in this operation. The product in these cases is solid, and is denominated a *sublimate.*



2. *Of the operations by which chemical changes are produced in the forms of bodies by the action of water and other fluids.*

Solution.—When a solid body is thrown into a liquid and disappears, the transpareney of the liquid remaining the same, the process is named *solution;* or *solution* is that operation by which the aggregation of a solid is overcome by a liquid, and a compound produced, which, retaining the fluid form, is transparent, and perfectly homogeneous. The liquid is generally supposed to be the substance exerting the active power, and has therefore been called the *solvent* or *menstruum.* It separates the particles of the solid or *solvend* from each other, and permanently suspends them by the state of combination into which they enter; but the attraction, as was before stated, is reciprocal, both as it regards the solid and the fluid. In general the solution of every solid in a liquid can be effected in a certain quantity only, or is limited; and when it is carried to its ultimate point, the liquid is said to be saturated. The solvent power, however, is not always limited, there being some instances in which a solid dissolves in a liquid in any proportion: thus gum and sugar dissolve in water in every proportion. The

solvent power of a fluid diminishes as it approaches to saturation, and the solution consequently goes on more slowly; but, by raising the temperature, it proceeds again more rapidly, and a much larger portion of the solid is taken up than could have been dissolved at a lower temperature. This effect of temperature, however, does not take place in every instance; for chloride of sodium, for example, and some other salts, can be dissolved in nearly as great quantity by cold as by hot water. When an increase of temperature augments the solubility of bodies, a portion of the solid, taken up by a heated liquid, is retained in combination as long as the increased temperature exists, but separates again as the solution is cooled down to the temperature of the atmosphere, or lower; and when this is properly conducted, salts are obtained in regular forms, or crystallization takes place.

Although a liquid be saturated with one solid, yet it may be still capable of dissolving a portion of another, and even of a third, when saturated with the second; until it be combined with, or hold in solution, three, four, or five different bodies at the same time. The liquid, indeed, in this case does not dissolve a large portion of any of the substances; but sometimes, from the mutual affinities which these exert, the whole proportion of solid matter dissolved is very much increased.

The solution of saline bodies in water requires no particular apparatus; as it can be conducted equally well in phials, or jars, or basins, provided the materials of which they are composed be such as can resist the action of the solvent.

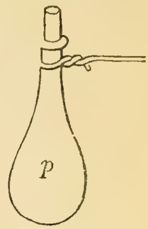
Lixiviation is a term applied to solution when the saline body consists of both soluble and insoluble ingredients. On a great scale it is generally performed in large tubs or vats, having a hole near the bottom containing a wooden spigot and faucet. A layer of straw is placed at the bottom of the tub, over which the substance is spread, and covered by a cloth; after which, hot or cold water, according as the salt is more or less soluble, is poured on. The water, which soon takes up some of the soluble parts of the saline body, is after a little while drawn off by the spigot; and a fresh portion of water is successively added and drawn off until the whole of the soluble matter be dissolved. The straw in this operation acts as a filter; and the cloth prevents the water from making a hollow in the ingredients when it is poured on, by which it might escape without acting on the whole of the ingredients.

In smaller operations, lixiviation may be conducted in glass matrasses, and the *ley*, which is the name given to the solution, filtered through a paper in a glass funnel.

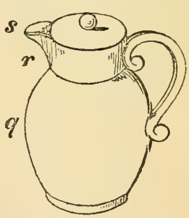
Maceration is that operation by which the soluble parts of substances, chiefly of a vegetable nature, are obtained in solution by keeping them immersed in *cold* water or in spirituous fluids for a sufficient length of time. It is frequently employed as a prepara-

tion for infusions and decoctions, which are always rendered more effective by the previous maceration of the materials.

Digestion is an operation similar to maceration, except that the power of the fluid is aided by a gentle heat. It is usually performed in a glass matrass, *p*, and the evaporation of the liquid impeded by stopping the mouth of the matrass slightly with a plug of tow, or tying over it a piece of wet bladder perforated with small holes. When the menstruum is valuable, as alcohol, for instance, another matrass, with a smaller mouth, may be inverted over the former, and the joinings secured by a piece of wet bladder; or, what is perhaps preferable, a long open glass tube may be luted to the mouth of the matrass which contains the materials. By these means, any part of the liquor which is resolved into steam by the heat is condensed, and conveyed back upon the materials. The matrass may be heated either by a common fire or a lamp, a water-bath or a sand-bath; and, when either of the latter is used, the matrass should not be sunk deeper in the water, or the sand, than the portion that is filled with the fluid. The process has been denominated *Circulation*, when the condensed vapours are returned upon the ingredients.



Infusion is intended principally to extract the volatile and aromatic principles of vegetable substances, which would be dissipated by digestion or by decoction; and also those parts of vegetables which are more readily soluble in water, such as gum, sugar extractive, tannic acid, the salts, and part of the resin, from the insoluble parts. The water is poured boiling hot on the materials, sliced, or reduced to a coarse powder, and kept in a closely covered vessel until they are cold; when the infusion or liquor is decanted off for use. The best infusion pots are of a globular form in the body, *q*, with the neck, *r*, cylindrical, and having a very large lip or spout, *s*, furnished with a grating, which should incline inwards towards the top, so as to retain the ingredients in decanting off the infusion. Infusions differ according to the length of time the water has stood on the materials, and the heat employed. In some instances agitation is necessary. Infusions may be made with cold water; and these are in general more grateful, although weaker, than those made with hot water.



Decoction, or boiling, is intended to answer the same purposes as infusion: but in a more extended degree. The solvent power of the menstruum is increased by the higher temperature: hence the liquor is deep coloured, and loaded with the soluble principles of the vegetable. Decoction is employed with advantage to extract

the mucilaginous parts of plants, their bitterness, and several other of the vegetable principles. It is generally performed in slightly covered vessels; but when the menstruum is valuable, as alcohol, for instance, a retort and a receiver, or the common still, may be used, in the body of which the decoction is prepared, while the vapours that would otherwise escape are condensed and preserved.

Decoction, however, is often a prejudicial mode of preparation, particularly for those vegetables the virtues of which depend wholly or in part on the essential oil, or volatile principles they contain; and even some fixed principles, such as extractive; the former are dissipated, the latter is oxidized and injured, by it.

Extraction.—If the liquor which is obtained by either infusion or decoction, be subjected to evaporation, the watery part is dissipated, and the portion which was extracted by it is obtained in the solid form, and is denominated an *Extract.* The same objections, when heat is employed, may be urged against this species of preparation as were stated under *Decoction.* In making extracts the lower the temperature at which the evaporation is conducted the better; and on no consideration should it exceed 212°. Evaporation in vacuo, as first practised by Mr. Berry, prevents the oxidizement of the extract, which alters its character; and the evaporation proceeds at a temperature of 140°.

By this method the extracts retain the odour of the expressed juice of the plants; they are less deep in the colour, and are greatly more energetic than those made in the open air They also retain their active properties longer than the ordinary extracts.

For some plants, alcohol or spirit of wine, of different degrees of strength, instead of water, is requisite for the preparation of extracts. This is especially the case when the plants, or roots, or barks contain resinous principles; and the only objection to the employment of spirit is the expense. Much of the solvent, indeed, may be saved by distilling off a large portion from the extract, and finishing the process by the spontaneous evaporation of the residue.

All the forms of preparation in which water is the agent may be regarded as various modifications of solution. When alcohol or diluted spirits are employed as menstrua, the ingredients subjected to their action are generally macerated, and the filtered fluid, which is the product, is denominated a *Tincture.*

3. *Of the operations in which changes are produced in bodies by chemical agents.*

Under this division we have only to notice *Coagulation,* which is the conversion of a fluid into a solid more or less consistent. The means employed for this purpose are increase of temperature,

alcohol, acids, and runnets. The effect appears to arise from a new arrangement of particles produced by the affinity exerted between the solid particles contained in the fluid and the coagulating substance.

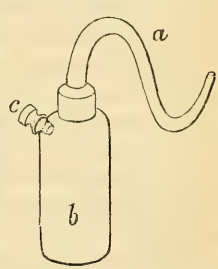
b. Of the operation in which changes are produced by the chemical action of one set of bodies upon another.

These are — Decomposition,
Dissolution,
Precipitation,
Crystallization,
Fermentation.

Decomposition implies the separation of the component parts of bodies from one another. It is produced, in some cases, by heat, or the introduction of caloric into a body in sufficient quantity to separate the particles from one another to a distance beyond their sphere of attraction, to overcome the affinity which held them in combination. It may be effected, also, by electricity; but in the greater number of instances it is the result of a superior affinity, which breaks the weaker affinity that holds the principles of the substance about to be decomposed in union, and produces new compounds. The influence of decomposing affinities is greatly modified by heat. The solvent power of water, also, is often requisite to bring bodies within the sphere of the attraction of affinity.

In pharmaceutical operations decomposition frequently occurs: and it is of much importance in extemporaneous prescription, to be acquainted with the circumstances which cause it.

Dissolution is the name given to cases of solution accompanied with decomposition, or some alteration in the nature of the dissolved body. In general, the dissolution of a body is attended with considerable effervescence, owing to the extrication of gases; and therefore the operation required to be performed in capacious vessels to prevent the loss of materials. When the gas is required to be preserved, and the operation is not on a large scale, the proof bottle, *b*, is used. It is furnished with a tubulated orifice, *c*, for permitting the introduction of acid or any other decomposing agent, and with *a*, a curved tube, ground into the opening of the bottle, through which the gas escapes. The gas is collected in inverted jars in a pneumatic trough.

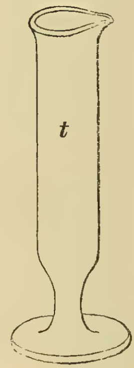


Precipitation is an operation in which decomposition also takes place, a solid substance being thrown down, from a liquid in which it was held in solution, by the chemical action of another body,

which is added to the solution. The substance employed to produce the precipitation is denominated the *precipitant;* the substance which is separated by its action, the *precipitate.* Thus, if into a solution of sulphate of magnesia a solution of soda be dropped, the magnesia separates from the sulphuric acid, falls to the bottom, and forms the precipitate; while the alkali, which is the precipitant, combining with the acid, thus set free, remains in solution in the state of sulphate of soda. Sometimes, the precipitate is separated, by the precipitant having a greater affinity for the liquid, and weakening its attraction to the substance which it held in solution. Alcohol, for example, when added to a saturated solution of sulphate of magnesia, precipitates the salt in a crystallized form, and combines with the separated water. In other cases the precipitate is an insoluble compound formed by the union of the added substance with that which was previously held in solution; as when a solution of baryta is added to a solution of sulphuric acid, sulphate of baryta is formed and precipitated. The mixture of a solution of a compound salt with the solution of another compound salt may produce a precipitate which is an insoluble compound, while a new soluble compound is formed at the same time, and remains in solution; in which case the decomposition is produced by double elective attraction. Thus, if a solution of acetate of lead be added to a solution of sulphate of zinc, the oxide of lead leaves the acetic acid, and combining with the sulphuric, forms sulphate of lead, which is insoluble, and falls to the bottom; while acetate of zinc, formed by the union of the oxide of zinc with the acetic acid, remains in solution.

The abstraction of caloric is sometimes employed as a precipitant: thus, if brandy be frozen, the water it contains separates and becomes solid, whilst the alcohol remains fluid. Vapours by the same agent may be separated from incondensible gases.

When the precipitate is the chief object of the process, it is necessary to wash it, after it is separated by filtration. This operation requires little attention when the substance thrown down is insoluble in water; but when it is in some degree soluble, attention is required to prevent the loss which might result from the use of too much water.



The best precipitating vessel is a very tall glass jar, *t*, narrower at the bottom than at the mouth, so that the precipitate may readily collect by subsidence, and the supernatant liquor be decanted off with more ease.

Precipitation is intended to separate solids from solutions in which they are contained; to produce new combinations which cannot readily be formed by the direct union of their constituents; and to purify

solutions from perceptible impurities. A knowledge of those substances which produce precipitation is, also, of much importance in extemporaneous prescription, to prevent the virtues of remedies from being destroyed by improper combinations.

In some cases when decomposition is effected by the addition of another substance, the separated body is not precipitated, but rises to the surface, and is denominated a *cream;* thus, by the addition of any acid to a solution of soap, the alkali unites with the acid, while the oil is separated, and swims on the surface of the liquor.

Crystallization, although it can scarcely be regarded as a species of precipitation, yet is very nearly allied to it. We have already noticed the theory of the operation, and therefore it only remains to mention in this place the modes in which it is effected for pharmaceutical purposes.

For the crystallization of any substance, it is necessary that it should be either in the aëriform state or a state of fluidity, produced, either by the agency of caloric or that of water.

Thus Camphor, Iodine, Arsenious acid, Benzoic acid, and Bichloride of Mercury pass at once from a state of vapour into a regular crystalline form; while metals and other bodies, which are capable of being fused, crystallize if they be allowed to cool very slowly, and are left at the same time in a state of rest; but this species of crystallization is never required for pharmaceutical purposes.

Salts are obtained in a crystalline form by a proper management of their watery solutions. When the salt to be crystallized is considerably more soluble in hot than in cold water, as, for example, *sulphate of soda,* it is only necessary to saturate hot water with the salt and set it aside to cool; but this must be slowly effected, by covering the vessel to prevent the access of cold air, and the too rapid consequent formation of a pellicle, which would produce an irregular mass, instead of well formed distinct crystals. Crystals thus formed generally contain, in a state of combination with the salt, a considerable proportion of water, which is thence termed *water of crystallization.* When the salt is not more soluble in hot than in cold water, crystals are obtained by evaporating the solution while hot, until a pellicle forms on its surface; when it is set aside to cool, during which the crystals form. After these are separated, the evaporation is repeated, and another crop obtained, until by a succession of evaporations, the greater part of the salt contained in the solution is separated in the crystalline state. The same effect may be produced by spontaneous evaporation.

The following method of obtaining very large and regular crystals has been pointed out by M. Leblanc.[1] The solution first evaporated to such a consistency that it shall crystallize on cooling;

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[1] *Journal de Physique,* lv. 300.

when it is cold, the liquor is poured off from the mass of crystals, which generally form at the bottom, and is put into a flat-bottomed vessel. In this, solitary crystals gradually form, the largest of which are to be picked out and placed in another flat-bottomed vessel at some distance from each other, and a quantity of liquid obtained in the same way by evaporating a solution of the salt till it crystallizes on cooling, poured over them. The position of each crystal is now to be altered once a day by means of a glass rod; for, when not turned, the face on which the crystal rests receives no increase of size. When the crystals have gained considerably in magnitude, the most regular are to be selected, and each of them put separately into a vessel filled with the same liquid, and turned, as already described, several times a day, until they attain the largest size which the species of crystal under treatment is capable of acquiring. It is, however, necessary to observe, that if the crystals be allowed to remain too long in one portion of the solution, the quantity of salt it contains becomes so much diminished, that the liquid re-acts upon the crystal, and partially dissolves it.

If a crystallizable salt be perfectly pure, the whole of its solution may be crystallized; but if two or more salts exist in the same solution, after crystals have been obtained by several successive evaporations and coolings, the remaining portion of the fluid, although saturated with saline matter, yet refuses to crystallize, and is then denominated *mother water.*

When two salts are contained in the same solution, the suspension of a crystal of one of them will determine the crystallization; and the other salt will be left in solution.

The vessels best adapted for crystallization are large flat dishes of Wedgwood's or other ware, such as have been already described as proper for the evaporation of liquids. When the crystallization is to be conducted slowly in the heat of the atmosphere, with the free access of air, deeper vessels are required, that there may be a considerable body of liquid; by which means crystals of considerable size and very regular in figure are procured. Sometimes the crystallization, particularly when it is effected without the aid of heat, is disturbed by minute crystals forming on the edge of the vessel, and the saline matter extending itself over its sides. This is best prevented by smearing the edge of the evaporating dishes with a little oil.

Crystallization is intended to obtain crystallizable substances in a pure state; and to separate them from one another, by taking advantage of their different solubility at different temperatures.

FERMENTATION.

The constituents of vegetable matter, when separated from the living plant, and placed under certain circumstances, act upon one another, and a spontaneous decomposition takes place, even at the ordinary temperature of the atmosphere. This process has been denominated *Fermentation* by chemists, on account of the intestine motion with which it is accompanied; and, as its phenomena and results vary according to the nature of the vegetable matter subjected to it, and the circumstances under which it occurs, the general process is divided into three species easily distinguished from one another. The 1st is named the *vinous fermentation* — of which the products are wine, beer, and other vinous fluids; the 2nd, the *acetous fermentation,* which produces acetic acid or vinegar; and the 3d, the *putrefactive fermentation,* in which gases, chiefly fœtid, are produced, and ammonia.

Each of these is occasionally artificially produced for pharmaceutical purposes, and therefore requires to be described.

Vinous fermentation. All vegetable substances containing saccharine matter, and albuminous principles, are susceptible of this fermentation. When a solution of sugar has added to it any such substance in a state of decomposition, at a temperature between 38° and 86° Fah., the taste of sugar is soon lost; carbonic acid is evolved; and an alcoholic fluid is formed. For the commencement of fermentation, the presence of water, sugar, and some decomposing nitrogenized substance, with a certain increased temperature, is requisite. In juices in which these are present, the fermentation is spontaneous: and as *yeast* is such a substance in a state of putrefaction, it is frequently used for this purpose in the formation of beer and wines. Soon after yeast is added either to *wort*[1], or to *must*[2], an intestine motion commences in the liquor, its temperature rises, it becomes turbid, and carbonic acid gas is extricated, and a scum, or hat, as it is termed, is formed on the surface of the liquid: but, after some time, the fermentation again gradually subsides, the scum which was formed during its continuance sinks to the bottom; the liquor becomes lighter, and instead of its sweet taste has acquired that peculiar taste and flavour which is denominated vinous. The yeast undergoes no change. This process of fermentation is never employed in the laboratory for the preparation of vinous liquors, although these are articles of the materia medica; but the cataplasms, which are prepared from carrots and similar

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[1] Wort is an aqueous infusion of malt. It consists of saccharine matter, starch, gluten, tannin, and mucilage.

[2] Must is the expressed juice of the grape. It contains water, sugar, a peculiar matter which changes into gluten by contact with the air, mucilage, bitartrate of potassa, tartrate of lime, chloride of sodium, and sulphate of potassa.

vegetables mixed with yeast, derive their virtues from the vinous fermentation into which they enter, extricating a large quantity of carbonic acid gas, which operates as a powerful sedative antiseptic.

Acetous fermentation. All liquors prepared by the vinous fermentation are susceptible of the acetous when kept exposed to the air in a temperature between 70° and 90°. Under these circumstances the liquor gradually becomes thick, its temperature increases, and filaments are seen moving through it in every direction, an intestine motion being excited, accompanied with a hissing noise: but, as this motion subsides, these filaments fall to the bottom, or attach themselves to the sides of the vessel: the liquor becomes clear and transparent, and has acquired a very sharp, acid taste. In this state it is denominated vinegar, and contains, besides the acetic acid and water, which are its principal components, mucus, malic acid, bitartrate of potassa, and some other vegetable constituents.

Pure alcohol, even when diluted with water, is not susceptible of this fermentation, unless in contact with certain matters, as spongy platinum, wood shavings, &c. which cause the change to take place at the expense of the oxygen of the air, and without themselves being acted upon; but when ferments are present, as in wine, beer, &c. the decomposition of the alcohol rapidly takes place.

Many vegetable infusions and decoctions undergo this fermentation in warm weather, demonstrating the necessity of preparing these every day during summer, as by the decomposition which takes place, their medicinal virtues are completely destroyed, when they are kept beyond twenty-four hours.

Putrefactive Fermentation. Almost every vegetable product, kept in a moist place, and in a temperature not under 45°, nor above 70°, undergoes spontaneous decomposition. The solid structure of the body is completely destroyed, and its ultimate principles, entering into new combinations, escape in the gaseous or aëriform state, leaving behind a small quantity of earthy and metallic matter only, which it contained.

This process, which is usually denominated the *putrefactive fermentation*, takes place only in organic matter of a higher order; it requires the presence of air, and of water. Vegetable bodies, which are very soluble in water, most readily undergo it; the surface of the liquor becomes covered with a mould; various elastic fluids, in which ammonia and phosphuretted and sulphuretted hydrogen gases are often perceptible, are extricated, and the vegetable matter is ultimately completely decomposed.

The knowledge of the circumstances which promote this species of spontaneous decomposition points out the necessity of preserving both vegetable and animal substances in perfectly dry places, and, when they have a tendency to attract moisture, of exposing them

in a free current of air to dissipate the humidity which they would otherwise absorb.

c. Of the operations in which oxidizement and deoxidizement are effected by means of a high temperature.

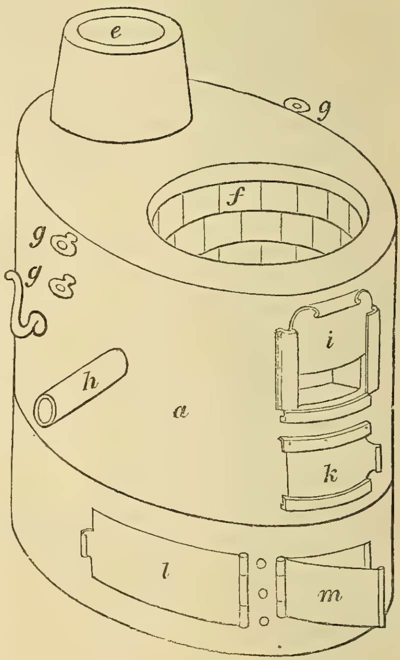
The degree of temperature at which pharmaceutical operations requiring heat are conducted cannot generally be obtained from a common fire; and therefore furnaces are necessary; and in the most universal use in every laboratory.

Furnaces differ in construction, according to the particular purposes for which they are chiefly intended; but the following essential parts are common to all furnaces: — 1st, The body or fire-place, for holding the fuel and the vessel containing the materials to be submitted to the action of heat. 2dly, The chimney, by which the heated air and the smoke escape. 3dly, The ash-pit, into which the ashes fall, and through which fresh air is admitted to the burning fuel.

In a well constructed furnace, the whole of the air which enters the ash-pit passes through the body of the furnace, and supports the combustion, after which the residue, being highly rarefied, passes off by the chimney; on the due height of which, and the proper regulation of the access of atmospheric air from below, the strength of the combustion, and consequently the heat produced, altogether depend. The access of the air is generally regulated by registers; which, in portable and smaller furnaces, are iron plates pierced with many holes of different sizes, which are generally fitted with brass stoppers, so that, according to the number of holes opened, a greater or a smaller quantity of air is admitted to the burning fuel. The chimney should be narrower than the body of the furnace, and of such a length that it can be heated throughout by the rarefied air which ascends through it; for it is by producing in the chimney a column of air of much less specific gravity than a corresponding column of the external air, that fresh air is constantly forced through the body of the furnace from below, and a strong draught produced. If the chimney be too short, all the advantage of a draught is not obtained; and if, on the other hand, it be too long, the air loses much of its heat before it reaches the summit, and that impedes, to a certain extent, the ascent of the rarefied air. According to Macquer, when the internal diameter of the furnace is 12 or 15 inches, and that of the chimney 8 or 9 inches, its height should be 18 or 20 feet.

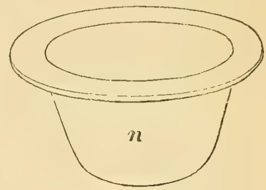
Of whatever substance furnaces are made, unless they be fixed and built of fire-bricks, they should be coated, to prevent the radiation, and consequent loss of heat: and the best coating is a composition of clay and sand. It is perhaps better, however, first to put a coating of charcoal and clay next to the sides of the furnace, before applying the clay and sand, as was recommended by Dr.

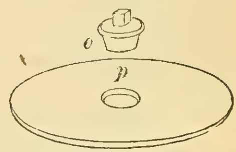
Black, particularly if the furnace be made of plate iron. The proportions he recommended were one part, by weight, of fine clay, and three parts of charcoal; which, being reduced to powder, is to be kneaded together with water, and the mass thus formed divided into balls of a moderate size. These being applied to the sides of the furnace, are to be beaten strongly with the face of a broad hammer, until a general coating of about one inch and a half cover the inside of the furnace, and the cavity assume an elliptical form.



A very convenient and useful furnace is that which was contrived by Dr. Black. It consists of an oval iron case, *a*, about 22 inches in height, 20 inches in diameter in the length of the oval, and 15 inches across; and lined in the body with the coating already described. On the top is fixed an iron plate having two apertures; one large, *f*, intended to receive a sand bath, a still, or any similar apparatus; and the other smaller, *e*, to which an iron tube, which acts as a chimney, is to be fixed. At the bottom of the body of the furnace, directly under the larger aperture, the grate is fixed; and under it the ash-pit receives the body, resting on a strong ring that encircles it at about half an inch deep. The ash-pit is furnished with a door, *m*, which opens on hinges, intended for removing the ashes; and also a register to regulate the admission of air to the burning fuel. The register is a plate of iron perforated with six apertures, the size of which increases in a geometrical ratio; so that by passing the sliding plate, *l*, over them, either one or more may be stopped at a time, and the supply of air, and of course the heat to be excited, can be regulated with great nicety. The fuel is introduced at the top; but there is a door also, *i*, for occasional use, in the side of the body of the furnace, through which fuel can be supplied during the conducting of any process; although, unless it be made to shut very close, this door is a disadvantage, as it prevents the admission of the air from being so precisely regulated. It has also an opening, *k*, with a sliding door, for receiving a muffle: *h* is

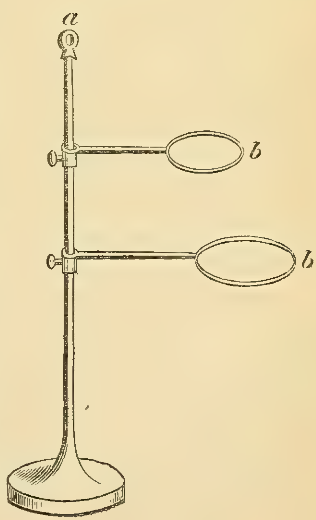
an earthen or an iron tube, which passes through the body of the furnace, and issues at the opposite side, intended for procuring hydrogen gas; or for inserting the nozzle of a pair of bellows, when it is desirable to increase the action of the furnace. Any thing may be suspended over the furnace by inserting an iron pillar into the eyes, *g g*, on each side, and stretching a strong bar or wire between them. The sand bath, *n*, is placed in the opening, *f*, of the furnace, when it is required; but at other times that opening is shut by the cover, *p*, which has a moveable plug, *o*, in its centre. A pair of tongs, *r*, bent near





the points, is a necessary appendage to this furnace. It may be used for a great variety of operations, and may be fitted with a dome for the purpose of throwing down the flame when it is to be used for fusing metals.

For small operations, when a great heat is required, a furnace may be constructed by simply inverting one large black lead, or a Hessian crucible, over another which is perforated with six holes in the bottom, intended to serve as a grating. This is placed over the portion of a third crucible, cut off so low as to leave the cavity about an inch deep only, and ground smooth above and below. The upper or inverted pot should have a large perforation to permit the heated air to escape, and the portion on which the second pot stands should also be perforated at the side to admit the external air, or the nozzle of a bellows. No luting is required. A heat sufficient to fuse any metal may be obtained in such a furnace. A sufficient heat for a great variety of small operations may be obtained from a lamp, on the principle of Argand's, with a double concentric wick. A standard, *a*, having moveable rings, *b*, *b*, attached to it, is necessary for supporting the retort or matrass at any height above the flame.



With regard to *fuels*, the best are undoubtedly charcoal and coke, or a mixture of these. The advantages of *charcoal* are its kindling readily, burning with a strong clear heat in a small draught, without running into slag, choking the grate, or melting the walls of the furnace; and owing to its containing only matter which is extremely combustible, the flues or chimneys never collect soot or other foulnesses. The chief objection to charcoal is its great price. *Coke* is much less expensive; but as it contains a mixture of earth and metallic oxides, it is apt in an intense heat to run together into a tough, cohesive slag, which adheres to the walls of the furnace, and to the sides of crucibles, choking up the grate, and of course preventing the proper draught of air for carrying on the combustion. These disadvantages, however, are remedied by mixing it with an equal bulk of charcoal; and this mixture forms the best fuel, when an intense heat is required.

The pharmaceutical operations usually performed by furnaces are —

Fusion.
Distillation.
Sublimation.
The oxidizement of metals.
The deoxidizement or reduction of metals.

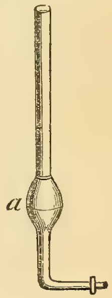
The first three of these have been already described.

Oxidizement of metals. This term signifies that process by which metals are converted into oxides, by absorbing oxygen from the air, when exposed to a certain degree of heat. The disengagement of the caloric and the light which oxygen gas contains, by the solidification of the oxygen in the oxide, is scarcely perceptible when the operation is conducted in atmospheric air; but if the oxidizement takes place in oxygen gas, it is rapidly effected, and caloric and light are extricated. This mode, however, of oxidizing metals is employed in small experiments only; but in all the processes of the laboratory for procuring oxides by the aid of heat, common air yields the oxygen. The metal, if it be not volatile at the temperature required for its oxidizement, is exposed to the heat of the furnace in a flat dish of baked clay, called a *roasting test*, and frequently stirred to present fresh surfaces to the air: but if the matter be easily volatilized, as is the case with zinc, it is thrown by pieces, at separate intervals, into a deep crucible, so placed as to admit the air and allow of the additions being made. If mercury be the metal operated on, it is generally put into a flat-bottomed matrass with a very tall narrow neck, the mouth of which is left open. This matrass is placed in a sand bath, and kept at a degree of heat nearly equal to the boiling point of the mercury, for many days: but it is perhaps better to use a retort with the bottom flattened, and the neck only slightly bent, that the globules of mercurial vapour may be condensed, and the metal fall back into the

vessel.[1] In this process the atmospheric air furnishes the oxygen, which readily combines with the volatilized mercury, while the form of the apparatus is intended to permit a renewal of it constantly to take place, without allowing the escape of the mercurial vapour. This process is now seldom performed.

Deoxidizement of metals, or their reduction, is that process in which the oxygen of a metallic oxide is separated, and the metal recovers its metallic form and properties. It is seldom performed on a large scale in pharmacy: but in cases of metallic oxides having been taking into the stomach, and proving fatal, it is of importance, in ascertaining their nature, to be able to reduce them to the metallic state by means of the blow-pipe and lamp; an apparatus by which minute substances may be almost instantaneously heated to a great degree, and their nature discovered with much accuracy.

The most common blow-pipe is a tube of brass or iron, bent near one of its extremities, and drawn out sufficiently fine to keep up a constant stream of air when it is blown into by the mouth applied to the opposite end. This form of blow-pipe is liable to one inconvenience, from the condensation of the moisture of the breath, in the course of blowing; to remedy which, a hollow ball or bulb, *a*, is made near the small end of the pipe; and, to render it more portable, this is divided through the middle, and fitted with a screw, so as to be put together when used. Small separate jet-pipes, or caps, are frequently adapted to slip on the small extremity of the blow-pipe, by which means any size of bore may be had recourse to, as a larger and more moderate, or a smaller and more intense flame is required. The flame for blowing through is best obtained from a wax or tallow candle with a very large wick, which must be kept moderately short by snuffing it frequently, and it must also be turned a little aside from the pipe.



In using this apparatus with advantage and ease, a little practice is necessary. As the flame is often required to be kept up for several minutes, the respiration must be carried on through the nostrils without interruption, and the stress of blowing performed merely by the compression of the cheeks upon the air held in the mouth. In subjecting any substance to experiment, it is to be placed either on a piece of charcoal or in a platinum spoon. When charcoal is employed, a large, compact, well-burnt piece should be chosen, and a small shallow hole scooped in it for receiving the substance to be heated. The flame of the candle or lamp is then to be directed upon this by means of the blow-pipe. The charcoal soon kindles round the hole, which is gradually enlarged; and the

[1] *Higgin's Minutes. Aikin's Dictionary*, ii. 75.

heat being thereby augmented and kept up uniformly round the substance, the charcoal aids, by its chemical effect, the reduction of the substance, or its deoxidizement. Carbonate of lead, thus treated, is converted into a globule of metallic lead; and the phosphates are partially reduced to phosphurets.

In many operations, much inconvenience arises in using the common blow-pipe, from both the hands of the operator being engaged; and therefore a double pair of bellows, which is fixed below the table, and worked by the foot of the artist, has been invented for giving the blast. Means have also been contrived for producing the blast by a stream of oxygen gas, or of mixed gases, as of oxygen and hydrogen, which excite a much more intense heat than can be produced by any other method. A very ingenious blow-pipe is that of Mr. Paul of Geneva, in which the flame is produced by vapour of alcohol.[1]

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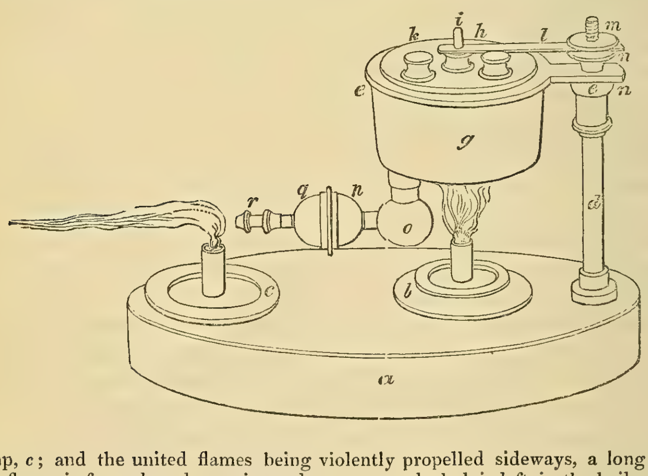
[1] *Mr. Paul's alcohol blow-pipe.* *a*, a hollow frame of wood, five inches in its longest dimensions, supporting the pillar, *d*, and the two lamps, *b*, *c*; the rim, *e*, slips upon the pillar, *d*, as low as the shoulder of the latter will permit, but it may be raised or lowered at pleasure, and kept fast by the screw-peg, *f*. The rim supports, *g*, the boiler, which is a hollow piece of thick brass, which will hold about f℥ij. of alcohol, and has four openings; three, *h*, *i*, *k*, at the top, and one at the bottom to receive the tube, *o*. The latter is long enough to reach the level of the outside of the boiler, and consequently, the alcohol in the boiler cannot readily boil over into the tube; and the opening, *k*, which corresponds with it, is closely shut by a screw-stopper, hollowed out a little beneath, to allow the free passage of the vapour down the tube. By the contiguity of *o* to the lamp, *b*, the vapour is prevented from condensing, and as it passes on through the globe, *p*, *q*, into the jet tube, *r*, it is directly kindled by the flame of



the lamp, *c*; and the united flames being violently propelled sideways, a long pencil of blue flame is formed, and remains as long as any alcohol is left in the boiler. The boiler is filled at the opening, *h*. The central hole, *i*, is nicely fitted with a brass plug, kept down by a thin slip of iron, *l*, which is confined at one end between two flat screws, *m*, *n*, on the top of the upright pillar. This acts as a safety valve, to prevent the vessel from bursting when the vapour cannot escape quick enough at the jet-pipe, *r*.

COATINGS, CEMENTS, AND LUTES.

In many chemical operations, although the nature of the substances require that glass vessels be used, yet, from the degree of heat to which they are exposed, these must be protected on the outside by a coating; and in all operations where the products are in any degree volatile, it is of importance that the joinings of the parts of the apparatus should be perfectly secured by coatings and lutes. Cements are requisite for repairing flaws and cracks.

Coatings are applied to the insides of furnaces, to prevent the too quick dissipation of the heat, and also to protect the iron and materials of which the furnace is made from being destroyed by the action of the fire. The coating used by Dr. Black has been already described; but another nearly as good may be formed by coarsely grinding fragments of pottery, and mixing the powder in moist clay in sufficient quantity to allow it to be moulded when wet. To render it more tenacious, some fibrous matter is generally added to the mixture, such as chopped cow-dung; the proportion of which, as recommended by Baumè, should be one ounce to every five ounces of the mixture. This is to be applied in the manner already described.

The same kind of coating may be used for glass vessels which are to be exposed to a red heat. The following is the mode of applying it. After kneading the coating material, so as to render it very plastic, let it be spread out on a flat table, and lay the bottom of the retort in the middle of the mass; then turn up the edges of the cake, so as to bring it round the whole of the vessel, pressing it down in every part with the fingers till it apply uniformly and closely. The material may also be applied in the state of thick cream, by dipping the retort repeatedly into it; and drying it after each immersion by turning it before the fire. The different layers of coating may be thus laid on very equally, from the thickness of $\frac{1}{4}$ to $\frac{1}{2}$ an inch; so as to make the retort resemble a strong earthen retort glazed in the inside; and, as the coating agglutinates in a full red heat, it will form an impenetrable covering which cannot be detached from the glass.

Cements and *Lutes* are formed of the same materials. They are generally composed of unctuous or resinous substances; mucilaginous or gelatinous substances; or of clay, lime, and similar materials capable of resisting a high degree of heat.

a. *Unctuous and resinous Lutes.*—These should be viscid, plastic, compact, and possess the power of resisting acrid vapours. The following are the best of this class.

1. Melt eight parts of bees' wax with one of turpentine; and according as it is required to be more or less consistent or pliable, add different proportions of any resinous substance.

This lute adheres very closely to the glass, is not easily penetrated by acrid vapours, and is very manageable. It cannot bear a heat higher than 140°.[1]

2. Dissolve spermaceti; and when melted, while it is hot, throw into it bits of Caoutchouc. This is an excellent lute where much heat is not required to be employed.
3. Take pure, dry, unbaked clay, finely powdered, beat it for several hours with a heavy iron pestle in a brass mortar, dropping in, slowly, some boiled linseed oil; or some amber varnish, prepared by melting yellow amber in an iron ladle, and mixing it with linseed oil. This lute can sustain a considerable degree of heat, is impenetrable by acids and spirituous liquors, and adheres very strongly to metallic or glass vessels previously rendered perfectly dry. As it softens in some degree, however, by heat, it is necessary to surround the luting with pieces of wet bladder, and to secure the whole by pack-thread firmly tied round both above and below the joint.[1] This lute improves by age. It should be kept in a covered pan in a cool cellar.
4. Glazier's putty, which is a composition of chalk and drying linseed oil, resembles very much the above lute in its qualities, and may be used as a substitute for it.
5. Take four parts of common resin, one of yellow wax, and one part of fine brickdust; melt the two former together, and when they are melted, stir in the brickdust. This lute adheres with great firmness, and forms also a good cement for stopping cracks in glass vessels.
6. Six parts of clay, one part of iron filings, and enough of linseed oil to form them into a paste, make a good cement for stopping cracks in iron vessels intended to be strongly heated.
7. The following cement is recommended for joining together glass or steel:—"Take of mastich five or six bits as big as peas, and dissolve them in as much alcohol as will render them liquid. In another vessel dissolve as much isinglass (previously soaked in water) in brandy or rum as will make two fluid ounces of a strong glue; warm it, and incorporate with it, by rubbing, two or three small bits of galbanum, or ammoniacum, and the mastich solution. Preserve the mixture in a well-stopped bottle, and gently warm it before use."[2]
8. A solution of shell lac in alcohol, added to a solution of isinglass in proof spirit, forms a cement that will resist moisture.

b. *Mucilaginous and gelatinous Lutes* are adapted only for operations which do not require a high temperature, and in which very acrid vapours are not extricated. They are easily applied, are

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[1] *Lavoisier.*

[2] *Aikin's Dictionary of Chemistry.*

sufficiently adhesive, and can be readily removed by simply moistening them with water.

1. Under this head may be mentioned the simple application of moistened bladder. To render it very adhesive, it should be soaked in tepid water, until it feels clammy to the touch; after which it contracts considerably as it dries, and adheres with a sufficient degree of force.
2. Linseed meal kneaded up with water to a sufficient consistence, and applied pretty thick over the joinings of the vessels, or almond meal treated in the same manner, form very convenient lutes, which dry and become firm in a very short time.
3. Flour paste spread upon slips of moistened paper forms a sufficiently good lute for many purposes.
4. Smear slips of linen on both sides with white of egg; then apply these neatly to the joinings of the vessels; and when they have been applied, shake loosely over them some finely powdered quicklime. This lute dries very quickly, is extremely hard, very cohesive, impervious to water, and impenetrable by most kinds of vapours.
5. Mix powdered plaster of Paris with white of egg, milk, glue, starch, or any mucilage, and apply it immediately.
6. Mix together equal parts of clay and lime, with about one third of flour and white of egg.
7. Mix together equal parts of colcothar and lime, with white of egg.

All the cements containing lime and gelatinous substances become so very hard that they cannot be separated from glass vessels without the aid of a sharp knife and some force; and, therefore, they can scarcely be applied to very thin vessels. They will not confine very corrosive acid vapours for a great length of time; but are excellent lutes for preserving a complicated apparatus steadily united and air-tight; and they will bear nearly a red heat. They are also the most useful kinds of cement for any accidental crack or failure of a lute already applied, although a stream of vapour may be bursting through at the time.[1]

c. *Earthy Lutes* are intended for operations which require a high temperature. The following are the best of this class:

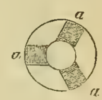
1. Mix burnt gypsum, in powder, with water to the consistence of a thick cream, and apply it immediately. This forms a lute which sets as soon as it is applied, and is firm; but a slight blow will easily crack it.
2. Dissolve one ounce of borax in half a pint of boiling water, and add as much slacked lime as will make a paste. By using a smaller portion of lime, this lute forms an excellent glazing for earthenware retorts, over which it should be spread with a

[1] *Aikin's Dictionary of Chemistry.*

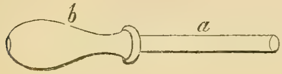
brush; but when dry, a coating of slacked lime and linseed oil, beaten till the mixture is plastic, should be laid over the whole of the lute.

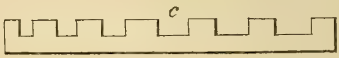
3. A very valuable fire lute may be made of about one part of glass of borax, five parts of brickdust, and five parts of clay finely powdered together, and mixed with a little water when used.
4. The same composition which has been already described as a proper coating for the inside of furnaces, is also an excellent earthy lute.
5. Six parts of clay, and one of iron filings formed into a paste by means of linseed oil, form an excellent cement for stopping cracks in iron retorts or boilers.

If the beak of a retort be too small to fit accurately to the neck of a receiver, the vacancy should be filled up by introducing short pieces of soft wood or of cork, *a*, *a*, *a;* and if the disproportion be very considerable, a cork must be fitted to the neck of the receiver, and a circular hole made in it, by a perforator, sufficient to admit the beak of the retort. The curved tube of a Woulfe's apparatus, when not fitted accurately by grinding, may be also fixed by means of a perforated cork. After the parts are thus firmly joined, the luting must be neatly and closely applied over the junctures; and the whole covered with slips of wet bladder, or with linen spread with one or other of the above described cements. The application of the lutes, although apparently very simple, yet requires some management, lest the luting of one juncture should disturb another already luted, which is apt to happen when applying the fillets and ligatures. When an operator, therefore, is not pressed for time, he should always allow the luting of one joint to dry before he applies luting to another; indeed, it is preferable not to apply the fillets and ligatures until after the luting has been applied to all the joints, and is nearly hard.



Perforators of corks are now used instead of the old imperfect file. They consist of an iron or tin tube, *a*, with a hollow handle, *b*, through which a wire can be passed to dislodge the piece of cork, which has been taken out of the perforation. They are usually sold in a series, adapted for the smallest requisite perforation up to the largest. In using them, the diameter of the perforation being previously determined, the proper perforator is selected by its entrance between the notches of the indicator *c*.





PART II.

MATERIA MEDICA.

MATERIA MEDICA is that department of the science of medicine, that treats of the nature and properties of the substances that are employed as remedies to restore health in diseased bodies.

According to this definition, it should comprehend every remedy, whether it be a simple, the production of nature; or a compound, artificially prepared by the pharmacopolist; or even an affection of the mind: but the British Colleges of Physicians confine the application of the term, in their pharmacopœias, to those remedies only which are simples, and such compounds as are articles of general commerce, or over the preparation of which they have no control. These pharmacopœias differ also from the works of the generality of systematic writers on Materia Medica, in arranging the substances alphabetically, without any regard to their affinities as natural objects, or to their medicinal virtues. This mode, although it be not so scientific, yet is much less liable to objection than many of the other methods which have been occasionally adopted; as the best of these have been, generally, too much modified by the prevailing theoretical doctrines of the day, which, unfortunately for medical science, have hitherto had too slight a foundation on truth to secure their permanence. The plan of the pharmacopœias has consequently been judiciously followed by the compilers of Dispensatories: and the convenience and utility of it are so generally acknowledged, that we the more readily comply with our own opinion of its propriety in adopting it.

This part of our work, therefore, contains the lists of the materia medica of the pharmacopœias issued by the London, the Edinburgh, and the Dublin Colleges. Subjoined to the name of each of the substances supplied by the vegetable and the animal kingdoms, is a description of the plant or the animal which yields the remedy given in the language and after the method of Natural History. The chemical components of each substance, as far as they are known, are also stated; and the analysis of such remedies as are more immediately the objects of chemical investigation, with the medical properties and uses of all of them, are detailed: so as to afford every useful information regarding them, in a form the most convenient for practical reference.[1]

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[1] The editor has also introduced in this part an account of some medicines not made officinal by the British colleges; but which he thought worthy of notice, being frequently employed in medicine. These will be readily distinguished, not being referred to any pharmacopœia.

ABIETIS EXCELSA. Vide *Pinus Abies.*
ABSINTHIUM. Vide *Artemisia Absinthium.*
ACACIA. *Spec. Plant. Willd.* iv. 1079.
Cl. 23. *Ord.* 1. Polygamia Monœcia. *Nat. Ord.* Leguminosæ.
**** *Leaves bipinnate, stipular thorns or prickles, elongated spikes.*
Species 73. Acacia *Catechu.*[1] Catechu. *Med. Bot.* 3d *edit. t.* 157. *Roxb. Coromand; Pl.* ii. 175. *Hayne*, vii. 48.
***** *Leaves bipinnate, stipular thorns, globular spikes.*
Species 87. Acacia *vera.* Acacia or Egyptian thorn, *Med. Bot. 3d edit. t.* 158. *Vesl. Ægypt. t.* 8. *bona.*

1. ACACIA CATECHU.

Officinal. CATECHU, *Lond. Edin. Dub.* Extract obtained from the wood. Catechu is also referred by the British Colleges to Uncaria Gambir, an extract from the leaf, and probably from other plants (*Edin*).

Syn. Cachou (*F.*), Katechu; Katchu (*G.*), Cato o Catecu (*I.*), Catecu (*S.*), Cato (*Portug.*), Japonisk jord (*Dan.*), Katechu (*Russ.*), Cutt (*Hind.*), Cuttacamboo (*Tam.*), Gambir (*Malay*).

This tree grows plentifully in the mountains of Kanhana, and various other parts of Hindostan, and now in Jamaica. It flowers in June. It seldom exceeds twenty feet in height, and one foot in the diameter of its stem, which is covered with a thick, rough, brown bark, and long, black, stipulary spines: towards the summit it is divided into many close branches. The leaves are placed alternately on the younger branches; and are composed of ten or seventeen pairs of pinnæ, nearly two inches long, each having about thirty to fifty pairs of linear leaflets, beset with short hairs; with a small gland on the common petiole between each of the 2nd, 3rd, or 4th terminal pairs of the pinnæ. At the base of each leaf are two short recurved, compressed spines. The flowers are hermaphrodite and male; axillary, and on close spikes four or five inches long; the calyx is tubular, hairy, dividing into five oval-pointed segments; the corolla is of one piece, whitish, twice the length of the calyx, and of the same form. The filaments are numerous, double the length of the corolla, crowded, with roundish anthers, and adhering at the base of the ovary, which is oval, supporting a slender style the length of the filaments, and terminated by a simple stigma. The fruit is a lanceolate, compressed, smooth, brown pod, with an undulated, thin margin; and contains six or eight roundish, flattened seeds, which emit a disagreeable odour when chewed.[2]

The inner wood of this tree is of a brown colour; and from it, according to Mr. Ker's statement[3], the *catechu* is prepared. "After

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[1] Ἄκανθος τῆς Ἀρίας χώρας, Theophrasti. Dioscorides also mentions this species of Acacia. The name in Bahar is *Coira* or *Keira.*
[2] N. Von Esenbeck affirms that the Bengal Catechu is obtained from the Nauclea *gambir.* Buchner's *Rep.* v. xxii. p. 185.
[3] *Med. Obs. and Enquir.* vol. v. p. 151.

felling the trees, the manufacturer carefully cuts off the bark and all the exterior white part, the alburnum or sap wood. The interior coloured part is cut into chips, with which he fills a narrow-mouthed unglazed earthen pot, pouring water upon them until he sees it among the uppermost chips; and when this is half evaporated by boiling, the decoction, without straining, is poured into a flat earthen pot, boiled to one third part, and then set in a place to cool for one day. The decoction is afterwards evaporated by the heat of the sun, stirring it several times in the day; and when it is reduced to a considerable thickness, it is spread upon a mat or cloth, which has previously been covered with the ashes of cow-dung. The mass is lastly divided, by a string, into square or quadrangular pieces, which are completely dried, by turning them in the sun, until they are fit for sale." On the Malabar coast a particular sect, named *Cuttcuries*, are the manufacturers of the Catechu.[1] The decoction is dried, after being formed into an extract, in the shade. Before Mr. Ker's account was published, Catechu was generally supposed to be extracted solely from the Areca nut; but that nut yields one kind only, which is made at Sinde in Mysore. It is very inferior, and seldom or never brought to Europe.[2] There are three other kinds of Catechu; the first named *Cuttacamboo*, the second *Cashcutti*, and the third *Gambir*.[3] All the five kinds are used by the Indian practitioners.[4]

This extract, when first introduced as a medicine into Europe, was named Terra Japonica, from the supposition that it came from Japan, and was an earth. It is named *cutt* by the natives of Hindostan, *cutch* by the English, and by different authors *khaath*, *cate*, *cachou*, *cachore*[5], and *catechu*.[6] There are two varieties of the true Catechu; one brought from Bengal, the other from Bombay. One variety is imported into Britain also from Singapore and Pegu, in bags, and sometimes in boxes or chests, containing from 3 to 4 cwt. each; and occasionally in small squares, in boxes. Pale and dark-coloured Catechu are sometimes mixed in the same package.

Qualities.— *Pale Catechu* is generally in small round or square cakes of a pale reddish-brown colour, dull surface, light and friable, with an earthy lamellated texture, and even fracture;

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[1] *Proceed. of Bombay Geo. Society*, 1838.

[2] Dr. Pereira thinks it probable that the so named Columbo Catechu, from Ceylon, is derived from this source.

[3] The production of Uncaria *Gambir* (*Lin. Trans.* v. ix.), a native of Malacca, Sumatra, and Cochin-China. Three varieties of Catechu are made from its leaves,— a black, brown, and white. The first and second only are brought to England.

[4] Guibourt has suggested that another Catechu is obtained from the Dhak tree, Butea *frondosa;* but, as Dr. Christison has remarked (*Disp.*), upon unsatisfactory grounds.

[5] *Bolduc. Mém. Acad.* 1709, p. 293.

[6] This name is said to be compounded of two Oriental words; *cate*, which signifies a tree, and *chu*, juice. *Ker*, l. c.

has a bitterish and astringent taste, leaving a degree of sweetness on the palate; it is inodorous, and has a specific gravity between 1·28 and 1·39. There are three varieties of this Catechu:—1. In cubes, rather more than an inch in diameter, and very fragile. It is very astringent, bitter, and leaves a sweet impression on the palate; and soon becomes mucilaginous or pulpy when chewed. It is the *Cuttacamboo* of the Tamul practitioners. The best is brought from Pegu, and is chewed with the Betel, by the better class of Hindoos.[1]—2. *Dark Gambir* is also in cubes (*Cashcuttie* of the Tamuls), and resembles the former variety in many respects, but it has internally a somewhat radiated and speckled aspect. It is more astringent than the first variety.—3. Another variety made at Singapore, called *yellow Gambir*, is in pale greyish yellow thin cakes, sweeter but less astringent than the two other varieties; it is not brought to Europe as an article of commerce.

Dark Catechu is in masses, has a deep chocolate colour internally, with the hue of rusty iron on the outside; the texture is uniform, and the fracture resinous, sometimes marbled and shining. It is heavier than the pale, the specific gravity being 1·45, and it has a more austere and bitter taste; but in other respects it agrees with the other kind. There are three varieties of this kind, namely, *ball, lump,* and *cake,* or *Colombo* Catechu:—1. Ball Catechu is in flattish, round balls, dense, hard, and of a uniform chocolate-brown hue: it is not very friable, and has a weak, astringent, bitterish taste, leaving a sensation of sweetness in the mouth. This is the produce of the Acacia *Catechu,* and is known as Bombay Catechu.—2. *Lump* Catechu is in large, irregular masses; it has a chocolate-brown hue. The masses are composed of agglomerated lumps. It is of fine quality; and is also the production of the Acacia *Catechu.* It is brought from Pegu, and called *Pegu Cutch.*—3. *Cake* Catechu is in circular cakes, 4 or 5 inches in diameter, and half an inch thick, dense, of a reddish-brown colour, and displaying a resinous fracture. It is powerfully astringent. It is known in the market by the name of *Singapore Cutch;* probably from Areca catechu (Pereira).

Both kinds of Catechu are often much adulterated with sand and other impurities. The tannic acid being the active matter of Catechu, that which contains most is the best. To ascertain the quantity, we should first act on Catechu with ether, then on the residue with water, and the weight of the watery extract gives the value in tannic acid. Water at 60° dissolves 3 parts in 4 of pale Catechu: the alkalies deepen the colour of the solution, until on standing it becomes of a deep mahogany hue. According to the analysis of Sir H. Davy, there appears to be very little difference between the two varieties. Both are almost entirely soluble in the

[1] Ainslie, *Mat. Med. of Hind.* vol. i. p. 65.

mouth; 100 grains, macerated in 18 fluid ounces of water, at 52° left $7\frac{1}{4}$ grains only undissolved, and these were chiefly lime, aluminous earth, and sand. The best Catechu leaves only 3 to 4 per cent. The solutions are inodorous, and slightly redden tincture of litmus. Strong sulphuric and hydrochloric acids throw down from a concentrated solution fawn-coloured precipitates: persulphate of iron, acetate of lead, chloride of tin, and gelatin, also throw down precipitates[1], demonstrating the presence of *tannic acid;* but the colour with salts of iron is greenish black. What remains after the action of alcohol is a coloured *mucilage;* and when fine powder of Catechu is washed with small quantities of water until all the tannic acid and mucilage are dissolved, the residue is a pale red *extractive matter*, inodorous, very slightly astringent, sweetish, soluble in water and in alcohol, and giving a green colour to solution of persulphate of iron.[2] The tannic acid of Catechu resembles that of galls, except that it strikes a green with the persalts of iron. It is united in the Catechu with a peculiar acid, termed Catechin or Catechuic acid; procured by acting on the residue of Catechu, exhausted by cold water, with hot alcohol, distilling off half the spirit, and, after filtering the cold solution, evaporating at 100° Fahr. to one half, and setting the remainder aside to crystallize. The crystals require 1130 parts of water at 60°, and only 4 at 212°, for their solution. They are soluble in alcohol and in ether; and form salts with alkaline bases. This acid is a compound of $C_{15}\ H_6\ O_6$: by the action of caustic alkalies in excess it is converted into Japonic acid ($C_{24}\ H_8\ O_8 + HO$); and by alkaline carbonates into an acid called Rubinic, of which little is known, except that it forms insoluble red compounds with some oxides. Catechuic acid does not precipitate gelatin, or throw down albumen or the alkaloids. The proportions of these constituents, according to Davy's experiments, were as follow: 200 grains of *Bombay Catechu* afforded 109 of tannic acid, 68 of extractive matter, 13 of mucilage, and 10 of earths and other impurities. The same quantity of *Bengal Catechu* gave 97 of tannic acid, 73 of extract, 16 of mucilage, and 14 of impurities[3]: hence the Bombay is preferred. Catechu is also nearly wholly soluble in alcohol. The solution is incompatible with decoctions of Cinchona, preparations of opium, and the alkaloids. Ether separates the tannic acid from the Indian Catechus.

When the Gambirs are treated with ether, and the solution concentrated by spontaneous evaporation, dendritic crystallized masses of a pale yellow colour form. They are partially soluble in water, and consist of tannic acid and a resinous matter.

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[1] Tincture of sesquichloride of iron produces a precipitate, which, on the addition of Liq. Potassæ, is re-dissolved, unless the quantity of the tincture be great, and the solution becomes of a deep purple, or port wine colour.

[2] Catechu is used by brewers for precipitating the mucilage and albumen of the malt.

[3] *Philosophical Transactions*, 1803.

According to the London College, Catechu from Acacia Catechu is firm, brittle, blackish in colour, having a bitter and very astringent taste. That from Uncaria Gambir occurs in porous, reddish coloured cubical masses, with a bitter, and strongly astringent taste, almost entirely soluble in boiling water, and the solution when cool does not give a blue colour with free iodine. Both varieties should so dissolve in ether, that 100 grains should yield an extract of which 40 grains are soluble in cold water. According to the Edinburgh College, the finest varieties should yield 53, and the lowest quality 28 per cent. of tannin dried at 280°.

Medicinal properties and uses. — Catechu is one of the most valuable of the vegetable astringents; and as the dark-coloured contains the greatest quantity of tannin (*tannic acid*), on which its astringency depends, it is to be preferred for medicinal use. It is employed with the best effects in dysentery and diarrhœa, when the use of astringents is admissible; in alvine and uterine hæmorrhages, leucorrhœa, gleet, and in obstinate catarrhal affections. As a local astringent, it is used in sponginess of the gums, and aphthous ulcerations of the mouth and fauces; and I have found the slow solution of a small piece of it in the mouth a certain remedy for the troublesome cough induced by a relaxed uvula hanging into and irritating the glottis; and on the same principle it is used by public singers to prevent hoarseness. Dr. Paris [1] recommends it as a dentrifice, especially when the gums are spongy; and I can verify this recommendation when the Catechu is combined with three parts of finely powdered charcoal. In prescribing it, the practitioner should bear in mind, that alkalies and their carbonates destroy its astringency; that the morphia in laudanum and in wine of opium is thrown down by it; that the active principle of ipecacuanha is destroyed by it; that metallic salts, with the exception of protosulphate of iron, form with it insoluble compounds; that it is precipitated by lime and baryta water, alum, nitrate of potassa, and sulphate of magnesia; and that isinglass and albumen also precipitate it where alkalies are not present.

An ointment composed of ℥ iv. of Catechu, ʒ ix. of Alum, ℥ iv. of white Resin, and f ℥ x. of Olive oil, with a sufficient quantity of water, is in great repute in India as an application to ulcers.

The dose of Catechu may be from grs. x. to ʒ j.

Officinal preparations.—*Pulvis Catechu compositus*, D. *Infusum Catechu compositum*, L. D. *Infusum Catechu*, E. *Tinctura Catechu composita*, L. *Tinctura Catechu*, E. D. *Electuarium Catechu*, E. *Confectio Catechu comp.* D.

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[1] *Pharmacologia*, 3d edit.

2. ACACIA VERA.[1]

Officinal. ACACIA, *Lond.* ACACIÆ GUMMI, *Edin.* ACACIA VERA, *Dub.* Acacia Gum, *or* Gum Arabic.

Syn. Gomme Arabique (*F.*), Arabisches gummi (*G.*), Arabische gom (*Dut.*), Gomma Arabica (*I.*), Goma Arabiga (*S.*), Gomma Arabia (*Port.*), Gummi Arabisk (*Dan.*), Araviskaia kamed (*Russ.*), Tolh (*A.*), Vullām pisin (*Tam.*), Kapitha (*Sans.*), Kavit ka gond (*Duk.*), Jewol latoo (*Cyng.*), Samagh arebee (*Arab.*).

The Acacia *vera* is found in almost every part of Africa; but the tree, Acacia *gummifera*, that yields the gum which is exported from *Barbary* to Great Britain, grows principally in the Atlas mountains, and at Bled-eljerrede; flowering in July. It is a thorny tree, with a hard withered aspect, and in general does not rise very high, although it occasionally attains the altitude of forty feet. The stem is crooked, and covered with a gray bark, which on the branches has a purplish tinge; the leaves are alternate, bipinnate, composed of from six to eight pairs of opposite pinnæ, with a small sessile gland between the base of each pair. On each side of the base of the leaves are two long, diverging, stipulary white spines. The flowers are hermaphrodite and male, crowded into globular heads (*capitula*), rather than spikes, which are supported on slender peduncles, and rise, four or five together, from the axillæ of the leaves; and the pods, which are downy, three or four inches long, and half an inch broad, are moniliform, and contain several flattish, brown seeds.[2]

The gum exudes naturally from the bark of the trunk and the branches of the tree, in a soft, nearly fluid state, and hardens in the air without losing its transparency. It is collected about the middle of December. "It appears," Mr. Jackson informs us, "to be the product of disease: for in the hottest seasons, and from the most sickly trees, the greatest quantity is procured. Very little or none is got in a moist, cool, or mild summer. It is gathered in July and August, when the weather is hot and parching. It has a faint smell when first stowed in the warehouses, and is heard to crack spontaneously for many weeks. The best Barbary gum is procured from Morocco, Rasel-wed in the province of Suse, and Bledhummer in the province of Abda."[3] It is now imported from Barbary and Morocco in large casks. When Gum Arabic was first brought to Europe, Marseilles was the sole depôt; and as the gum was supposed to come from the ports of Gedda and Tor, near

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[1] Ἄκανθος αἰγυπτίη Hippocratis. Κόμμι τῆς Ἀκακίας Discoridis. In Barbary it is named *attaleh.* — *Jackson's Morocco*, 4to. p. 33. At the Cape of Good Hope it is called *Dornboom.*—Sparmann. The Arabs in Upper Egypt call it *Sant.* Prosper Alpinus treats of it under the names *Acatia, Sant, Akakia.* — *De Plantis Ægypti*, p. 11. *tab.*

[2] From the unripe pods the *acaciæ veræ succus* of the ancients was expressed. — Vide *Murray, App. Med.* ii. 412. The seeds yield a reddish dye. — *Jackson*, l. c.

[3] *Jackson*, p. 83. In 1805, the quantity exported from Mogodor to London was 277,534 lbs. — Ib. l. c.

the isthmus of Suez, in the Red Sea, it was called *Gomme Gedda* and *Gomme Turique.*

Turkey Gum is supposed to be the produce of two species of Acacia; namely, A. *vera* and A. *arabica.* The former grows near Senegambia and in Egypt; it has smooth branches and bipinnate leaves; pinnæ 2 pairs; leaflets 8–10 pairs, oblong-linear, with a gland between the pinnæ: the latter is a tree with thorny branches; the thorns stipulary, of irregular length; and bipinnate leaves; pinnæ 5 pairs: leaflets 15–20 pairs, glabrous. Flowers in globose heads. It is supposed to be a variety of A. *vera;* and is an inhabitant of Upper Egypt, Nubia, and Arabia. The gum furnished by these trees is in pieces of various sizes, round and angular, of different degrees of transparency, of a glassy lustre, white and yellowish colour, inodorous, insipid. It is very friable; entirely soluble in water, the solution affording an acid reaction. It comes chiefly through the Levant. There are three varieties of this gum. That named *G. Turique* by the French is the best (*Gum elect.* in the shops of our druggists): the *Gum Gedda,* which forms the second kind, is in larger masses, deeper coloured, and less pure than the former; and the third, a variety of the second, is as dark-coloured as Gum Senegal.

Gum Senegal is the production of different species of Acacia [1]; but chiefly of Acacia *verek,* a large tree growing on the banks of rivers in Senegal.

Although the above and many other Acacias yield gum, yet only six kinds of gum are recognized in commerce:—1. *Gum Arabic,* in white, much cracked, irregular round pieces; 2. *Barbary gum* [2], in small, compact, transparent, yellowish or brownish-yellow pieces, very brittle; 3. *Gum Gedda,* in longer, roundish, brownish-red, not very brittle pieces; 4. *Gum Senegal,* which was introduced into Europe by the Dutch in the 17th century, and is often mixed with the Barbary gum [3]; 5. *Cape Gum,* an inferior gum, somewhat resembling Barbary gum; and 6. *East India gum,* which comes from Bombay, and is more coloured and tougher than any of the other kinds. Gum is imported in chests, serons, casks, cases, and bags. The best gum is adulterated with the inferior

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[1] A. *Adansonii;* A. *albida;* A. *vera.*

[2] From A. *gummifera.*

[3] Although, by the treaty which delivered up Senegal to France in 1783, the gum trade was reserved to England, and this treaty has never been annulled, yet no advantage was taken of this right by the English, until the commencement of the year 1821, when the trade was again renewed at Portendic, under the protection of Commodore Sir George Collier.—Portendic is in latitude 18° 19′ north, by 16° 10′ west of Greenwich. The Acacia forest of Sahel, which yields a very pure white gum, is sixty miles, and the forest of El-Hiebar eighty miles, from Portendic. The gum is collected and brought to the coast by the Trarzhar Moors, who receive in exchange baft and other English goods: "the usual quantity given for a piece of blue baft, which costs from fifteen to thirty shillings, is from 100 to 133 lbs. weight of gum."—*Sierra Leone Royal Gazette,* May 26th, 1821.

kinds; and sometimes with starch, when sold in powder: but this is easily detected by boiling the powder in water and testing the cold mucilage with iodine.

Qualities. — Gum is generally in irregularly shaped pieces, hard, brittle, semitransparent, its fracture possessing a considerable degree of lustre: it is neither fusible nor volatile. When pure it is almost colourless, or of a pale yellowish hue; is insipid, inodorous, and dissolves completely away in the mouth. Its specific gravity varies from 1·3161 to 1·4317. Gum Senegal is generally of a darker colour, and more clammy and tenacious, and the other gums are less pure, particularly that brought from the East Indies, which is still darker in colour and not very soluble.[1]

Gum is soluble in water, either cold or hot, and forms a viscid solution; which, if evaporated, becomes very thick and adhesive, and at length the gum is obtained in a concrete form, equally soluble as before. It is also soluble in the vegetable acids; but insoluble in alcohol, which throws it down from its solution in water. It is insoluble in ether, and in bland and volatile oils: yet, owing to its viscidity, it renders by trituration both the volatile and fixed oils and resins miscible with water, forming white opaque mixtures. Oxalate of ammonia throws down oxalate of lime in the solution. Concentrated sulphuric acid blackens, carbonizes, and partially decomposes it, strong nitric acid converts it into mucic with a little oxalic acid. Solutions of the alkalies and alkaline earths dissolve it without producing any change.

Gum Arabic consists chiefly of a substance called *Arabine*, which is soluble in water, precipitated by alcohol and by the subacetate of lead, but not by the neutral acetate. The characteristic properties of a solution of gum depends on the presence of this principle. Its formula is $C_{12}\ H_{11}\ O_{11}$. According to Guerin, Gum Arabic consists of 79·40 of *Arabin* + 17·60 water + 3·00 ashes = 100·00.[2] A trace of gluten has also been discovered in gum, by means of the tincture of Guaiacum.

Medical properties. — Gum exerts little action on the living system. It is a simple nutritive demulcent, serving to lubricate abraded surfaces, and involve acrid matters in the primæ viæ. It effects these purposes the more readily when given in large doses, from its passing through the bowels, without being much acted upon by the assimilative functions.[3] In the solid form it is scarcely

[1] The gum which exudes from the cherry, plum, and other trees of the genus *Prunus*, in this country, is Cerasin; but the gum alluded to is very similar to Gum Arabic, and is furnished by the Acacia *Arabica* (*Roxburgh's Coromandel Plants*, t. 149.), or Babul tree of Hindostan. The gum is called *Babuled gund*, by the natives. But the pure gum of India is furnished by different species of *Terminalia*, and by the Feronia *Elephantum*.

[2] *Journ. de Chimie Méd.* vii. 742.

[3] It is, nevertheless, sometimes used as food by the Moors, and also by the Boschis-

ever given, unless to sheathe the fauces, and allay the tickling irritation which occasions the cough in catarrh and phthisis pulmonalis, in which cases a piece of it is allowed to dissolve slowly in the mouth. It is chiefly used in the state of mucilage. Vide *Mucilago Acaciæ.*

Officinal preparations.—*Mistura Acaciæ,* L. *Mucilago,* E. D. *Mistura Acaciæ,* E. *Troc. Acaciæ,* E.

ACETOSELLA. Vide *Oxalis Acetosella.*

ACETUM (BRITANNICUM). *Lond. Edin.* (Density, 1006 to 1019) *E.* (1·019) *L.*

ACETUM GALLICUM. (Density 1014 to 1022.) *E. Edin. Dub.* French Vinegar.

Syn. Vinaigre (*F.*), Essig (*G.*), Aceto (*I.*), Vinagre (*S.*), Vüinacdike (*Danish*), Winättika (*Swed.*), Canchiea (*Sans.*), Khull (*Arab.*), Chooca Wynazin (*Malay*), Kadi (*Tam.*), Cirka (*Pers.*) Kudidia (*Cyng.*).

This is a well-known acid liquor, which has been in use from a very early period.[1] It is produced by exciting the acetous fermentation in substances which have undergone, or are susceptible of, the vinous fermentation. Sugar and water, the saccharine vegetable juices, infusions of malt, malt liquors, cider, and wine[2], may be converted into vinegar, by adding to them yeast or any other ferment, and exposing them in vessels to which the air has access, in a temperature between 75° and 90°. I shall examine it as made from wine and from malt.

1. WINE VINEGAR, *Acetum Gallicum,* E. D. In wine countries, as France and Italy, vinegar is made from the lees of wine, which are worked up with new wine, then strained and exposed to the heat of the sun, or placed in stoved rooms, in vats or casks set upright, with a hole cut through the heading, and left open until the whole of the liquor is thoroughly acidified. The temperature of the place where these vats are placed should be between 68° and 80°. Between each vat a kind of cistern is sunk in the ground, into which the vats can be emptied, and again filled from it by a pump placed in each cistern. Each vat has a false bottom on which the stalks of vine twigs and vine leaves are placed to aid the fermentation. When the heat is considerable, the fermenting liquor is drawn off into the cistern, and pumped into another barrel, containing fresh twigs or *rape,* as it is technically called, to check the excessive fermentation; and this process is repeated at certain in-

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men, of Southern Africa; and at Senaar, in Dongola, is much employed in cookery: six ounces are sufficient for the daily support of an adult.

[1] Moses mentions vinegar, and it seems to have been in common use among the Israelites. It was also much used by both the Greeks and the Romans.

[2] New wines are better for this purpose than old, as they contain more extractive matter. The French name, from which our term vinegar is derived, means *sour wine: vin,* wine, *aigre,* sour.

tervals until the vinegar is fully made. If the weather be moderately warm, the vinegar is left for some time on the rape, before it is drawn off into barrels or air-tight vessels, for keeping it.

In France wine vinegar is made from red and white wine, the former being deeper coloured than the latter: the colour, however, is sometimes removed by filtering it through recent animal charcoal, but it dissolves a small portion of the earthy matter of the charcoal. White-wine vinegar is for this and other reasons always preferred to that made from red wine. The best French vinegar is made at Orleans; it is about one-sixth stronger than British vinegar.

2. MALT VINEGAR, *Acetum Britannicum,* L. E. In this country vinegar is prepared chiefly from malt. An infusion of malt or wort is made, then properly cooled, and put into large and deep fermenting tuns; "where it is mixed with yeast, and kept in fermentation for four or five days." The liquor is then distributed into smaller vessels, placed in a chamber heated by means of a stove; and kept there for about six weeks, or until the whole is soured. This is then emptied into common barrels, which are placed in the open air, the bung-hole of each being simply covered with a tile to keep out the wet: and in this situation such a gentle fermentation goes on, that in four or five months, according to the heat of the weather, perfect vinegar is formed. The process is then completed in the following manner: "Large tuns are employed with a false bottom, on which is put a quantity of rape, the refuse of raisins and other fruit, left by makers of home-made wines. These rape tuns are worked by pairs: one of them is quite filled with the vinegar from the barrels, and the other only three quarters full, so that the fermentation is excited more easily in the latter than the former, and every day a portion of the vinegar is laded from one to the other till the process is finished."[1] The slow fermentation in barrels is now seldom used: heated chambers being preferred. Malt vinegar has a more or less deep yellowish-red colour, nearly the same taste as the white wine vinegar, but the odour is less agreeable. It is manufactured of four degrees of strength, distinguished by the numbers 18. 20. 22. 24., the last of which is also called *proof vinegar.*

In Germany vinegar is made by exposing any dilute alcoholic fluid to the action of the air by means of platinum, or generally by chips of wood first steeped in vinegar, by which the exposed surface is much increased, and the change of the alcohol into vinegar, or acetic acid, quickly effected.

The theory of the acetous fermentation is as follows:—By exposure to the air, oxygen is absorbed, part of the hydrogen is withdrawn, and uniting with oxygen forms water, the remaining

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[1] *Aikin's Dictionary of Chemistry,* art. *Vinegar.*

compound combining with another portion of the oxygen produces acetic acid: the following equation represents the change:

1 eq. of alcohol ($C_4 H_5 O + H O$) + 4 eq. of oxygen (O_4) = 1 eq. of acetic acid ($C_4 H_3 O_3 + H O$) + 2 eq. of water ($H_2 O_2$).

Although alcohol alone cannot easily be converted into vinegar, yet the strongest wine produces the best vinegar; and hence that made from malt is weaker, less pure, and more liable to spoil, than wine vinegar. The essential part of vinegar is *acetic acid* and *water;* but it also contains colouring matter, some undecomposed *alcohol, gluten, mucilage, sugar, extractive matter,* a small proportion ($\frac{1}{1000}$) of its weight of *sulphuric acid,* and often some *malic* and *tartaric acids.*

Qualities.—Vinegar, when well made, is clear and limpid, has an agreeable penetrating odour, and a pleasant acid taste.

The colour varies from a pale yellow to a deep red: and as it is derived from the extractive matter, malt or *British* vinegar is always higher coloured than wine or *French* vinegar. When long kept, particularly if it be exposed to the air, vinegar becomes muddy and ropy, acquires an unpleasant smell, loses its acidity, and putrefies. It, however, may be kept good for a much longer time if it be boiled for a few minutes, so as to coagulate and separate the albuminous principle, on the presence of which the above changes depend. It should be preserved in well corked bottles.[1] British vinegar contains sulphuric acid, which is allowed to a certain extent by the excise laws: it may be detected by a solution of acetate of baryta, forming, when dropped into the suspected vinegar, a white precipitate, which is *insoluble* in hot nitric acid. If 1000 parts yield more than 2·5 of sulphate of baryta, the vinegar contains too much sulphuric acid. Hydrochloric acid is detected by nitrate of silver forming a precipitate, which is insoluble in nitric acid; but soluble whilst it is still moist in liquid ammonia. Nitric acid is detected by first mixing some common salt in the vinegar, then saturating with potassa, and evaporating to dryness: if gold leaf be then diffused through equal parts of sulphuric acid and water, and the mixture added to the dry residue and boiled, if the vinegar contains nitric acid, the gold leaf will be dissolved.[2] If *grains of paradise, spurge flax, capsicum,* or *pellitory of Spain,* which are sometimes used to adulterate vinegar, be present, they can only be detected by the taste. Sulphuretted hydrogen should neither colour British nor French vinegar. Ammonia in slight excess causes a purplish muddiness, and slowly forms a precipitate of the same colour.

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[1] Vinegar termed No. 24. is estimated to contain 5 per cent. of real acid.

[2] *Brande's Manual of Pharm.* p. 5.

The use of vinegar as a condiment, and an antiseptic, for pickling and preserving animal and vegetable matter, is well known.

Medical properties and uses.—Vinegar largely diluted, when taken into the stomach, acts as a refrigerant, promotes diaphoresis and the discharge of urine: and when externally applied is moderately stimulant and astringent.

In inflammatory fevers it may be used to acidulate the ordinary beverage. It is given as a remedy in putrid diseases: and it is the most easily procured, and the best means of counteracting the effects of over-doses of narcotic poisons; for which purpose it should be administered in doses of a table-spoonful, frequently repeated, after the stomach has been freely emptied by a proper emetic. It is employed as a glyster in obstinate costiveness; and externally in the form of fomentation, or of lotion, in burns, bruises, sprains, and chronic ophthalmia; and, diluted with water, it is the best lotion for clearing the eye of small particles of lime, when they adhere to any part of the ball or the lids. Its vapour is inhaled in putrid sore throat; and it is diffused through sick rooms with the view of neutralising pestilential effluvia: but as a fumigation it has little efficacy. The dose of vinegar is f℥ ss. to f℥ iv. in any bland vehicle; and the quantity given in glysters f℥ j. to f℥ ij.

Officinal preparations. *Acetum distillatum*, L. E. *Syrupus Aceti*, E.

ACE'TUM DISTILLATUM. See Part III.

A'CIDUM ACETICUM, *Lond.* See Preparations.

ACIDUM ACETICUM E LIGNO VENALE, *Edin. Dub.* See *Acetic Acid.*

ACIDUM ARSENIOSUM. See *Arsenicum.*

ACIDUM BENZOICUM, *Lond.* See Preparations.

ACIDUM CITRICUM, *Lond. Dub.* See Preparations.

ACIDUM GALLICUM, *Lond.* See Preparations.

ACIDUM HYDROCYANICUM. See Preparations.

ACIDUM HYDROCHLORICUM, *Lond.* See Preparations.

ACIDUM HYDROSULPHURICUM, *Lond.* APPENDIX. Hydrosulphuric acid, or sulphuretted hydrogen.

This compound is introduced in the London Pharmacopœia simply as a test, the uses of which will be described in Part III. PHARMACOPŒIA APPENDIX. It is never employed medicinally except in the form of sulphuretted mineral waters, an account of which is contained in the general Appendix to the work. This acid is usually prepared by acting upon some metallic sulphuret, as of iron, by means of dilute sulphuric or hydrochloric acid; a sulphate or chloride of the metal is then produced, and the sulphuretted hydrogen is given off in the form of gas.

Qualities.—It is a transparent colourless gas, possessing a

peculiar fœtid odour, not unlike that of rotten eggs. Sp. gr. 1·171. Soluble in its own volume of cold water, the solution having an acid reaction, inflammable, burning with a blue flame, water and sulphurous acids being the products of its combustion. Its presence can be readily detected by a salt of lead, which becomes blackened by it. By cold and pressure it can be condensed into a liquid state.

ACIDUM MURIATICUM, *Edin. Dub.* See Preparations.

ACIDUM NITRICUM, *Lond. Edin.* A. NITRICUM VENALE, *Dub.* See Preparations.

ACIDUM OXALICUM. *Oxalic Acid.*

Oxalic acid exists, ready formed, in many vegetable and in some animal bodies. Combined with potassa, it is found in the leaves of Oxalis *acetosella* and *corniculata,* Rumex *acetosa,* and Geranium *acidum*; with soda, in Salsola-*soda;* and with lime, in the roots of Rhubarb, Valerian, Beetroot, several lichens, and of many other plants. Berthollet procured it from honey, hair, tendons, albumen, and some other animal matters; but that which is found in the shops, manufactured for the purposes of art, is produced artificially by the action of nitric acid on sugar, or molasses, or potato-starch. The following process, which was first described by Bergman, is still adopted for the production of oxalic acid.

Into a tubulated retort put one ounce of white sugar, or of potato-starch, and pour over it five ounces of nitric acid, of sp. gr. 1·42, diluted with f ℥ x. of water. When the whole is dissolved, digest the liquor until it cease to afford nitrous fumes, and the colour of the fluid disappear. Empty the contents of the retort into a wide vessel, upon cooling, a crystallization will take place, which is *oxalic acid.* On boiling the lixivium with two ounces of nitric acid in the retort, until the red fumes almost disappear, a second supply of crystals will be obtained. One hundred grains of sugar, when properly treated, yield fifty-eight grains of crystallized oxalic acid; and twelve parts of potato-starch afford five of the acid. The *rationale* of the process is very obvious; the nitric acid is partially decomposed, and yields up a portion of its oxygen, which is one of its components, to the sugar, which is a compound of oxygen, carbon, and hydrogen; by this addition of oxygen, the carbon is converted partly into oxalic partly into carbonic acid, and the hydrogen is wholly carried off in the form of water. The components of oxalic acid, are two eqs. of carbon + 3 of oxygen; the crystals contain three equivalents of water, one equivalent of which is basic. Formula $C_2\ O_3 + HO + 2\ HO$.

The crystals should be purified by repeated solution in distilled water and recrystallization.

Qualities.—The crystals of oxalic acid, when they are properly

prepared, are flat four-sided prisms, with the sides alternately larger. They are white, transparent, inodorous, have a very acrid, sour taste, and redden all the vegetable blues, except indigo. One grain of oxalic acid communicates a sensible acidity to 2633 grains of water. The crystals effloresce in a dry warm air: they dissolve in eight parts of water at 60°, and in their own weight of boiling water; in four parts of alcohol at a mean temperature, and in two parts of boiling alcohol. They are sparingly soluble in ether.

Oxalic acid combines with alkalies, earths, and metallic oxides, forming oxalates. Hydrochloric and acetic acids dissolve it without alteration; but it is decomposed both by sulphuric and nitric acids aided by heat. It is readily distinguished by its affording a white precipitate with lime water, or the salts of lime, which is insoluble in an excess of the acid; but readily soluble in nitric acid. With solution of nitrate of silver it forms a whitish precipitate, which, after being carefully dried, detonates. It reduces the solution of gold; and yields a bluish precipitate (*oxalate of copper*) with sulphate of copper.

Medical properties and uses.—Oxalic acid, in *small* doses, when it is dissolved in a very large quantity of water sweetened with sugar, forms an agreeable cooling beverage, which has been used in febrile diseases, in the same manner and with the same intention as lemonade; but much risk attends its employment. It has also been employed to check external hæmorrhagy, which it appears to do by charring the blood as it issues from the wound, and thereby mechanically stopping its flow. It is a virulent poison when swallowed in large doses; and from the resemblance of its crystals to those of sulphate of magnesia, many fatal accidents have occurred from mistaking oxalic acid for that purgative salt. The bitter taste of the sulphate and the sour of the acid would always prevent such accidents, were individuals to taste their medicines before swallowing them: but besides the occurrence of accidents, oxalic acid has been too frequently employed by the wretched suicide for the purposes of self-destruction. It is, therefore, important that every medical practitioner should be acquainted with the qualities of oxalic acid, its effects on the animal economy, and the means of counteracting these, when it has been taken in a sufficient dose to operate as a poison.

The exact extent of the dose of oxalic acid which may be taken with impunity has not been determined; but its poisonous properties are more or less virulent according to the degree of dilution of the dose. From some experiments on animals, which I made ten years since, and the published details of the appearances in dissection of several fatal cases of poisoning by oxalic acid, I was led to form an opinion that "the primary morbid action of this poison is on the stomach itself, on the coats of which its chemical action

occasions the organised animal solid to enter into new combinations, and thence produces a decomposition both of the acid and the part to which it is applied:" that the acid, however, also enters into the circulation by absorption; but "that the proximate cause of death from oxalic acid is the suspension of the functions of the heart and brain, which are sympathetically affected by the local injury done to the stomach."[1] The subject has been, since then, investigated with much care and great ingenuity by Dr. Christison and Dr. Coindet, and their observations published in the Edinburgh Medical Journal.[2] From the labours of these gentlemen, I am induced to change my opinion as to the extent of the injury done to the living stomach, and to believe that the pultaceous state of that organ, which was found by me in my experiments on dogs, is to be attributed to the solvent action of the acid on its coats after death. I am, however, still of opinion, that death is less to be attributed to the sedative power of the poison acting on the brain and spine, to which it is carried by absorption, than to the sympathetic action on the nervous system from the local injury of the stomach; an opinion according with their first conclusions, that "oxalic acid, when introduced into the stomach in large doses, and highly concentrated, irritates it, or corrodes it by dissolving the gelatin of its coats; and death takes place by a sympathetic injury of the nervous system."[3]

The general symptoms attending poisoning by oxalic acid are burning pain in the stomach, violent and incessant vomiting, the matter ejected being commonly dark-coloured and sometimes bloody; in some cases there have been violent gripings and purging; the pulse soon sinks and becomes almost imperceptible; and this state is followed by deadly coldness of the limbs, attended with lividity of the fingers and nails, and clammy sweats: convulsions, but not in every instance, and insensibility, precede death. With regard to the appearances after death, no particular change in the external state of the body has been noted. On opening the body, the *stomach* is found, generally, to contain a quantity of dark-coloured fluid, which is probably extravasated blood charred by the poison; in some instances, the coats of the stomach have been found greatly injured, presenting appearances of great vascularity, thickening of the mucous coat, the rugæ pultaceous and easily wiped off, and, in some cases, the other membranes have been found tender, and even perforated, so that the contents of the organ have escaped into the cavity of the abdomen. The lungs and heart have not been often examined; but in the lower animals killed by oxalic acid, both have presented indications of inflammation having existed in them, par-

[1] *London Med. Repos.* vol. iii. p. 386.
[2] See *Edin. Med. and Surg. Journ.* vol. xix. p. 163.
[3] *Ibid.* p. 185.

ticularly the lungs. The vessels of the brain have been found turgid.

The fatal effects of poisoning by oxalic acid are so rapid, that little opportunity is afforded for counteracting them by medical art. The first object certainly, in every case, is to evacuate the poison from the stomach; and when the stomach pump is at hand, it should be instantly employed. The vomiting which usually supervenes precludes the necessity of employing emetics; and copious dilution, which in other cases of corrosive poison is advisable, is more likely to promote the absorption of the acid, and, consequently, increase its sedative powers. Before, therefore, emetics are employed, if they should be deemed necessary, the activity of the poison should be weakened by altering its nature by some substance with which, in chemically combining, its solubility is diminished. That chalk produces this effect, I discovered in making the experiments already alluded to: and many instances have since occurred in which its administration has saved the lives of individuals poisoned by oxalic acid. The lime of the chalk unites with the oxalic acid, and forms an oxalate, which is perfectly inert. Magnesia may be employed instead of chalk, and it has the advantage of not inconveniencing the patient by the extrication of carbonic acid gas, which is copiously evolved when the chalk unites with the acid; but, as the oxalate of lime is less soluble than the oxalate of magnesia, and, consequently, more inert, it may be questioned whether the inconvenience of the gas be equivalent to the greater security from the employment of chalk. A mixture of chalk and water, or of magnesia and water, should, therefore, be instantly given when oxalic acid has been taken in a large dose; and, after the local effects of the poison have been counteracted, the system should be supported by cordials combined with opium, and the oxalate afterwards carried out of the system by the aid of purgatives.

To obtain legal evidence in cases of poisoning by oxalic acid, when none of the poison is found, we may be guided, to suspect the nature of the poison, by the symptoms and the post-mortem appearances; but a correct opinion can be formed only by an analysis of the vomited matter, the contents of the stomach and its coats. For this purpose the vomited matter and the contents of the stomach should be separately diluted with distilled water, and the coats of the organ itself boiled in distilled water. These solutions should then be separately filtered and decolorized with chlorine, and subjected to the following tests. If oxalic acid be present, chloride of calcium will occasion a precipitate which is soluble in a small quantity of nitric acid, but not in hydrochloric, unless a very large quantity of the acid be used. Sulphate of copper throws down a bluish white precipitate in any fluid con-

taining free oxalic acid, which is insoluble in hydrochloric acid; and nitrate of silver occasions a heavy white precipitate, which, when dried, and heated over the flame of a candle on the point of a spatula, becomes brown at the edge, then suddenly fulminates, and is all dissipated in white fumes. This is a very delicate test; for Dr. Christison informs us that, from a quarter of a grain of oxalic acid dissolved in 4000 parts of water, he and Dr. Coindet procured enough of the oxalate of silver to demonstrate its fulmination twice.[1]

ACIDUM PYROLIGNEUM, *Edin.* See Preparations.

ACIDUM PHOSPHORICUM DILUTUM. See Preparations.

ACIDUM SULPHURICUM, *Lond. Edin.* ACIDUM SULPHURICUM VENALE, *Dub.* Sulphuric acid. (*Specific gravity*, 1·843, *Lond.* 1·840, *Edin.*)

Syn. Acide sulphurique (*F.*), Vitriolöl schwefelsaüre (*G.*), Acido solforico (*I.*), Vitriool oli.—Reines Schwavebzuur (*Dutch*), Vitriol olje (*Dan.*), Vitriolja, Swafwelsyra (*Swed.*), Sernaia Kislota (*Russ.*), Gundaica Atr. (*H.*), Ghendaya Trāvagum (*Tam.*), Arckgowgird (*Pers.*), Roohazim (*Arab.*).

This acid is said to be found, in a concrete state, in the cavities of some volcanic mountains, and dissolved in some mineral waters[2]; but, for the purpose of medicine and the arts, it is prepared artificially, either by decomposing sulphate of iron[3] by the process of distillation in close vessels, or by the combustion of sulphur. The first mode is the most ancient, and is still employed in several places on the Continent; but the second is that generally adopted by the manufacturers in Great Britain, and therefore requires particularly to be described. It comprehends two distinct processes.

1. Into a chamber lined with sheet-lead, having no opening but a small door placed a few inches from the floor, and made to shut very close, water is poured so as to cover the floor, and rise upon it to the height of one or two inches. A mixture of eight parts of refined Sicilian sulphur and one of nitre is burned on a furnace, in

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[1] *Edin. Med. Journ.* vol. xix. p. 198.

[2] M. Baldassari stated that he had found it, in 1776, crystallised in a grotto of Mount Amiata: M. Pictet saw it dropping from the roof of a grotto near the town of Aix, in Provence: M. Humboldt found it mixed with hydrochloric acid in the waters of the Rio-Vinaigre in Colombia; and Vauquelin detected it in the water of a lake in the island of Java. It is also found nearly pure in the sour springs of Byron, Genesse county, North America.

[3] Hence the old names, oil of *vitriol* and vitriolic acid, which are still the commercial names of this acid, from *green vitriol*, the old name of the sulphate of iron. This method is still practised at Nordhausen, in Germany. The acid is disengaged from the oxide of iron by the heat; but, owing to the small quantity of water which it contains, it is of greater specific gravity and more fuming than the acid which is manufactured in this country. The specific gravity of the fuming acid of Nordhausen is 1·896.

such a manner that the vapour is conducted into the leaden chamber.[1] The nitric acid of the nitrate yields oxygen to the sulphur, and converts a portion of it into sulphuric acid, which combines with the potassa of the nitrate: but the greater part of the sulphur in vapour uniting with the oxygen of the air of the chamber is formed into sulphurous acid gas, whilst nitrous acid results from the decomposition of the nitric acid: these uniting, aided by humidity, lose their gaseous character, and form a white crystalline compound, which coming in contact with the water below, the sulphurous acid is changed into sulphuric at the expense of the nitrous acid, which being thus robbed of a portion of its oxygen, escapes in the form of binoxide of nitrogen. This gas, now rising to the roof of the chamber, towards the aperture, attracts a fresh supply of oxygen, and becomes again nitrous acid, which descending, owing to its density, among the sulphurous acid gas, once more converts it into sulphuric acid, and is again disengaged when it comes in contact with the water, to undergo fresh combinations and decompositions, which go on successively until the whole of the sulphurous is changed into sulphuric acid.[2] When the water is sufficiently acidified, and attains a sp. gr. of 1·6, it is drawn off through a leaden pipe into rectangular leaden boilers, in which it is concentrated to a density of 1·70 to 1·75. It contains, besides sulphuric acid, some sulphurous acid, a portion of nitric oxide, and some sulphate of lead. The liquor is at first of a brownish colour; but after it is concentrated and purified, first by evaporation in leaden boilers, and afterwards by boiling in large green glass or platinum retorts, it becomes a colourless dense fluid, having, when perfectly pure, a specific gravity not exceeding 1·8485: and is brought to market in large globular glass bottles, called *carboys,* surrounded with wickerwork. It is sold under the name of *oil of vitriol.*

2. In the improved process, the sulphur is burned on an iron plate in a furnace, which communicates, by means of a tube, with a series of chambers lined with lead, and containing water on their floors, into which the sulphurous acid formed by the combustion of the sulphur is conveyed. After this part of the process has proceeded for some time, an iron pot, containing a mixture of nitre and sulphuric acid, is placed in the furnace; and, at the same time, steam from a boiler is admitted into the chambers. The nitrous gas, thus extricated, and the steam acting on the sulphurous acid, nearly in the manner already recited, changes it into sulphuric acid, which is absorbed by the water in the leaden chambers. The

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[1] This process was first used by Dr. Roebuck in 1749.—*Edin. Phil. Trans.* vol. iv.

[2] A white saline matter is often deposited on the sides of the leaden chambers. Dr. Thomas Thomson analysed this, and found it to consist of sulphurous acid, sulphuric acid, nitric acid, sulphate of lead and water.—*Records of General Science,* vol. iv. p. 96.

residual gases, after passing through the whole series of chambers, escape into the air and are dissipated.

On the Continent the nitrous gas is extricated in an apparatus adapted for the purpose, by the action of nitric acid on treacle; by which means oxalic acid is formed, at the same time that the nitrous gas is supplied.

In some of the principal manufactories the acid is concentrated in platinum retorts; in boiling it the acid not only loses a great portion of its water, but the sulphurous acid which it contains before it is boiled is dissipated. It is drawn off from these retorts, through siphons, into carboys.

Sulphuric acid thus prepared is not perfectly pure, but is united with about three or four per cent. of saline matter, which consists of two thirds of sulphate of potassa, and one third of sulphate of lead; the latter derived from the chambers in which it is manufactured. Both these impurities are precipitated by adding three parts of distilled water to the acid, which can again be concentrated by distillation; hence the absence of turbidness, on the addition of water, is a good test of the purity of this acid. The sulphate of lead is thrown down in the form of a white insoluble powder; from which the pure acid can be decanted. The amount of these impurities may be readily ascertained by evaporating a definite weight of the acid in a platinum cup, placed on the red cinders of a common fire.[1] It is sometimes adulterated with sulphate of potassa, for the purpose of increasing its specific gravity; in which case the best method of detection is to saturate the suspected acid with ammonia, and then to expel the sulphate of ammonia thus formed by a red heat: the sulphate of potassa with which the acid was adulterated will remain fixed. According to Dr. Ure, the pure liquid acid, which is, accurately speaking, a hydracid of sp. gr. 1·7245, consists of about 81·54 parts of real acid and 18·46 of water; and the elements of the real acid[2] are 40 of sulphur, and 60 of oxygen, in 100 parts of acid; or, independent of water, of one atom of sulphur + three atoms of oxygen, eq.=40.

Qualities.—Liquid sulphuric acid[3], when pure, is as colourless and transparent as water[4], inodorous, corrosive, heavy; and has the consistence of oil; its specific gravity at a temperature of 60° Fahr. is 1·835—1·845, and one fluid ounce weighs fourteen drachms.

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[1] Dr. Ure, who suggested this test, says, "If more than 5 grains of matter remain from 500 of acid, we may pronounce it sophisticated."—*Journal of Science and the Arts*, vol. iv. p. 115.

[2] *System of Chem.* 5th ed. vol. i. p. 288.

[3] Anhydrous sulphuric acid, when perfectly pure, is a tough, transparent solid, which liquefies at 66° into a colourless liquid; boils at 122°; and evolves fumes in the air. It is a component of 1 sulphur and 3 oxygen.

[4] Sulphuric acid is so easily coloured by contact with either vegetable or animal matters, without being deteriorated, that we cannot regard the slight colour which it acquires from these circumstances as any indication of its impurity.

It evolves no fumes. It has all the generic characters of an acid, reddening the vegetable blue colours when diluted with a sufficiency of water; but when undiluted, as it carbonizes all vegetable and animal matters, it turns vegetable colours brown. Even when largely diluted, it has an intensely acid taste. When rubbed between the fingers, it feels at first unctuous, owing to its attracting moisture, and dissolving the cuticle; but it afterwards excites a burning sensation. It freezes at 36° below 0 into six-sided prismatic crystals[1], bevelled at both extremities: when of the specific gravity of 1·840, it boils at 600°; and, at a higher temperature, it is decomposed and converted into sulphurous acid and oxygen gas. When of a sp. gr. of 1·845 it consists of 1 eq. of anhydrous acid + 1 eq. of water. It attracts water so rapidly from the atmosphere, as to increase its weight one third in twenty-four hours, and to double its weight in the course of a month (hence the necessity of keeping the air excluded from it); and at the moment it unites with water, the temperature of the mixture is much raised: this rises to 300°, when 73 parts by weight of the acid are suddenly mixed with 27 of water. It unites with water in all proportions. It acquires a brown colour when mixed with any vegetable matter[2], and converts syrup into charcoal; therefore bottles in which it is kept should be stopped with glass stoppers. When brought to sp. gr. of 1·780, by being diluted with water, it boils at 435°, and freezes at 45°, or 13 degrees above the freezing point of water; a fact important to trading chemists, as in this state it is apt to burst the bottles in which it is kept, by its expansion in the act of freezing.[3] It forms neutral salts termed *sulphates*, with the alkalies, earths, and metallic oxides; separates the acids of all other salts, and decomposes the alkaline and earthy sulphurets. The strength of this acid is readily determined by saturating it with dry carbonate of soda, 53·3 grains of which indicate 40 of real acid. An unerring test of the presence of this acid, in any liquid, is a solution of chloride of barium, which throws down a sulphate of baryta, insoluble in nitric acid.

Sulphuric acid sometimes contains nitric acid, an impurity readily detected by pouring, gently, a solution of protosulphate of iron over some of the suspected acid in a tube: if it contain nitric acid, the iron, being peroxidized by it, presents a deep red line at the point of contact of the acid and the solution. The nitric acid is got rid of by adding sugar to the sulphuric acid, in the proportion of gr. viij. for f ℥ viij. of the suspected acid, and boiling until the

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[1] *Macnab, Hudson's Bay.*

[2] This is owing to its strong affinity for water, breaking the affinities which exist between the vegetable components, so as to occasion the hydrogen and oxygen to unite and form water, while the carbon is set free.

[3] See *Parke's Chemical Essays*, vol. ii.

acid becomes pale. After the nitrous gas is removed, it may be completely purified by distillation in a glass retort containing some pieces of platinum, and completely embedded in hot sand, in a sand pot. Arsenious acid is, also, sometimes present in sulphuric acid: when iron or copper pyrites have been used instead of Sicilian sulphur, it is easily detected by diluting the acid and passing through it a stream of sulphuretted hydrogen gas, which throws down a yellow sulphuret of arsenic, if arsenious acid be present. A third impurity is sulphate of lead, which is precipitated by diluting the acid with water. It may be again concentrated by decanting off the clear acid, and boiling off the water.

Medical properties and uses.—This acid is a valuable tonic astringent; but, as it is employed internally in a diluted state only, its medicinal powers will be explained under the article *Acidum Sulphuricum dilutum*, Part III. Although it powerfully corrodes the skin, yet, on account of its fluidity, it cannot be used as an escharotic; but when united with sixteen times its weight of lard, it forms an ointment which has been successfully employed in the cure of virulent scabies. Still more diluted with lard, it has been used as a counter-irritant in rheumatism. It is a strong corrosive poison, combining with the albumen of the part and forming it into a sulphate. It also carbonizes the tissues to which it is applied. When it has been taken into the stomach, either accidentally or as a poison, it produces the following symptoms: excruciating pain in the stomach and bowels, faintings, feeble pulse, frequent trismus, difficult deglutition, vomitings, convulsions, and death. The tongue, uvula, tonsils, insides of the cheeks, and fauces, appear of a dirty white colour, and wrinkled, the teeth are surrounded by a black sordes, and the lips are brownish. The voice is altered, the breath fœtid, and there are often bloody stools. What is vomited, effervesces with chalk and marble, and corrodes leather. It most frequently proves fatal without entering the stomach, by its corrosive action on the œsophagus. The mental faculties remain entire to the last. The best antidote is magnesia, or chalk and water.[1]

Officinal preparations.—*Acidum Sulphuricum purum*, E. D. *Acidum Sulphuricum dilutum*, L. E. D. *Acid. Sulphuricum aromaticum*, E. D.

ACIDUM TANNICUM, *Lond.* See Preparations.

ACIDUM TARTARICUM, *Lond. Dub.* See Preparations.

ACONITINA. Now omitted from London Pharmacopœia; described under ACONITUM.

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[1] I witnessed a case in which a fluid ounce of the strong acid was swallowed, with the intention of committing suicide, by a farrier; and, although it remained an hour in the stomach before it was ejected by vomiting, yet the person recovered.—T.

ACONI'TUM.[1] *Spec. Plant. Willd.* ii. 1235.

Cl. 13. *Ord.* 3. Polyandria Trigynia. *Nat. Ord.* Ranunculaceæ.

G. 1062. *Cal.* none. *Petals* five, the highest arched. *Nectaries* two, peduncled, recurved. *Pods*, three to five.[2]

** *With blue corollas.*

Sp. 8. A. *Napellus* (Lond. Edin. Dub.). *Med. Bot. 3d ed.* 461. *t.* 165. *Eng. Bot. t.* 2730. *Hayne*, xii. 12.

Officinal. ACONITI FOLIUM, RADIX, *Lond.* ACONITI RADIX, *Dub.* ACONITUM, *Edin.* The leaves and root of Monkshood.

Syn. Aconit Napel, Chaperon de Moine (*F.*), Eisenhut, Blauer-strumhut (*G.*), Monnikskappen (*Belg.*), Monnikskap (*Dutch*), Stermhut (*Dan.*), Stormhatt (*Swed.*), Napello (*I.*), Napello (*Port.*), Aconito Napelo (*S.*), Borets (*Russ.*).

The roots are napiform and fibrous; the stem is simple, firm, elongated, erect, smooth, rising to the height of five or six feet, leafy, and terminating in a long, simple, cylindrical raceme of flowers. The lower leaves are few, alternate on channelled petioles; being divided to the base into five broad cuneiform lobes, trifid, and deeply cleft; the petioles are shorter, and the leaves less divided, the nearer they are to the summit of the stem: the colour of the whole is a deep green on the upper disk, and a pale green on the under; both sides are naked, smooth, and shining. The flowers are of a deep purple, hairy, on unifloral, erect, axillary, pubescent, pedicels, with subulate bracteoles. The calyx consists of five petaloid sepals; two lateral and orbiculate, two inferior and oblong, and the uppermost helmet-shaped, semicircular, and acuminate, covering two singular, peduncled petals; cucullated, the spur of each being hooked and blunt; the lip lanceolate, revolute, and bifid. The filaments are spread, and white at the base, where they closely cover the germens; but the upper part is filiform, purple, spreading, and bearing whitish anthers. The ovaries are three, and smooth.

For medicinal use, the leaves should be gathered when the flowers appear, and the roots dug up immediately after the period of flowering, as the parts are then most active.

Qualities. — Aconite roots and leaves have a faint narcotic odour; and a moderately bitter, acrid taste, leaving a sensation of numbness followed by a painful feeling of heat in the mouth, when they are much chewed. The whole of the plant is poisonous; but

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[1] *Labor. Chem.* 1808.

"Quæ, quia nascuntur dura vivacia caute,
Agrestes Aconita vocant." — *Ovid.*

But Theophrastus derives the name from *Acone*, a city of Bithynia, near which it grew in great abundance: others derive it from ἀκόνη, a stone, because it grew in stony places.

[2] I have left the definition of the genus by Willdenow, but the following is more accurate: — "*Sepals* petaloid, irregular, deciduous, or withering, upper sepal helmet-shaped. *Petals* two, on long stalks, prolonged at the apex into a bag hidden beneath the helmet."—*Lindley's Flora Med.*

the deleterious qualities of the leaves are lost in a considerable degree when they are dried, or long kept, and much of the acrimony is dissipated. Its narcotic principle was discovered by M. Brandes and Peshier to be an alkaloid, which has been named Aconitina or Aconitine. It is contained in the plant in combination with aconitic acid, a green fat oil, a black oil, albumen, and starch. The recent plant, and the root, yield one-fourth of their weight of expressed juice, and one eighth of their weight of extract.

Aconitina procured from the watery solution of an alcoholic extract of the plant by precipitation with ammonia, and after purification with ether, to separate it from another body which has been called *Anemonine.* It occurs in the form of small white masses or in powder, sometimes having a glistening appearance resembling crystallization; but, under the microscope, no crystals could be discovered by the editor; without odour, having an intensely acrid taste. The fine powder, arising during weighing, often causes much irritation in the nares and throat. Aconitine is not altered by air; when heated to 176° Fahr., it melts into a transparent mass, and then burns. It is not volatile. It is very little soluble in water, but readily dissolved by alcohol and ether: its solutions are strongly alkaline. Aconitina is a base, neutralizing acids, and forming salts, which, however, do not crystallize. The solutions of the salts are precipitated by potash, soda, and ammonia, and the carbonates of the fixed alkalies; also by chloride of gold, but not by chloride of platinum. Aconitina has a composition expressed by the following formula (when dried by air pump), $C_{60}\,H_{47}\,N\,O_{14}$; of gold salt $\{C_{60}\,H_{47}\,N\,O_{14},\ H\,Cl + Au\,Cl_3 + 2\,H\,O\}$.[1]

Aconitic acid crystallizes in white needles, soluble in water, alcohol, and ether. Composition, $\{C_4\,H\,O_3 + H\,O\}$. Can be formed artificially by the decomposition of citric acid by heat.

Medical uses and properties.—Aconite is narcotic, diaphoretic, and in some cases diuretic.[2] It causes a sensation of tingling in the mouth, followed by irritation in the stomach. In over doses it occasions violent nausea, vomiting, hypercatharsis, vertigo, cold sweats, mania, and convulsions, which terminate in death; and these effects appear to depend on its action, partly as an acrid on the intestinal exhalants, partly as a narcotic on the nervous system; for although it operates topically, yet dissections of fatal cases have not displayed any particular marks of inflammatory action. Its active properties are undoubtedly due to the aconitina. It destroys sensibility without affecting the mental faculties; it has also a very powerful sedative influence on the heart's action.[3]

Stoerk first administered aconite internally as an anodyne in

[1] Dr. A. von Planta.

[2] De Candolle informs us that the peasants employ it to cure dropsy.

[3] In Dr. Fleming's Treatise on Aconite will be found a detailed account of the action of this drug.

chronic rheumatism, gout, exostosis, paralysis, and scirrhus; and since the publication of his experiments, in 1702, it has been advantageously employed in similar cases, and also in amaurosis, scrofula, cancer, itch, venereal nodes, and intermittents. Much caution is required in the exhibition of it; and it is absolutely necessary to know the length of time it has been gathered, as its activity varies so very considerably, as to require this to be ascertained before the dose can be apportioned. The plant is given in the form of powder, extract, and tincture; its preparations may be combined with calomel, antimonials, camphor, and guaiacum. The dose of the powder is one or two grains, gradually increasing it to six or eight. There are several cases of the poisonous properties of Aconite on record; it causes tingling of the mouth and throat, formication of the extremities, and paralysis of sensation, which is soon followed by fainting and death. I know of no decided antidote; astringent infusion, tea, coffee, have been recommended.

Aconitine is much used as an external application, and no remedy acts so powerfully and efficaciously as a topical benumber in neuralgic affections, producing at first intense tingling, and often redness of the part to which it is applied, followed by loss of sensation of the skin, and relief of the neuralgic pain. An ointment made by rubbing up 1 grain of Aconitine, and 1 drachm of lard, is generally of sufficient strength. Care should be taken that the Aconitine is pure, as a spurious article has often been sold which is altogether useless. In some experiments made about five years since by the editor, it was found that $\frac{1}{50}$ grain of pure aconitine (made by Mr. Morson) killed a moderate-sized dog; whereas 1 or 2 grains of the spurious alkaloid only produced slight sickness.

Officinal preparations.—*Tinctura Aconiti*, L. D. *Extractum Aconiti*, L. E.

ACORUS. *Spec. Plant. Willd.* ii. 119.

Cl. 6. *Ord.* 1. Hexandria Monogynia. *Nat. Ord.* Acoraceæ.

G. 663. *Spadix* cylindrical, covered with florets. *Cor.* petals six, naked. *Style* O. *Capsule* three-celled.

Species 1. A. *Calamus.* The Sweet-flag. *Med. Bot. 3d edit.* 725. *t.* 248. *Smith. Flor. Brit.* i. 373.

Officinal. CALAMUS AROMATICUS, *Edin.* Sweet-flag.[1]

Syn. Acore vrai ou odorant (*F.*), Gemeiner Kalmus (*G.*), Kalmus (*Dutch, Dan., Swed.*), Calamo aromatico (*I.*), Acora calamo (*S.*), Tartarskie Ziele (*Polish*), Aur; Kalamus (*Russ.*), Vassamboo (*Tam.*), Vudge (*Pers.*), Shivah Bach (*Beng.*), Igir; Kusset alderirch (*Arab.*), Wudda Kuha (*Cyng.*), Bach (*H.*), Vacha (*San.*), Deringgo (*Javanese*).

The sweet-flag is found growing in marshes and rivulets, over the greater part of Europe and Asia. It is abundant in all the

[1] Καλάμου ἀρωματικοῦ of Dioscorides is supposed to be an Andropogon; and this plant is his Ἄκορον.—*Royle, Essay on Antiq. of Hindoo Med.* p. 33. *Journ. de Chim. Méd.* i. p. 192.

marshy counties of Britain, producing its flowers in May and June.[1] The London druggists are chiefly supplied from Norfolk.

The rhizome is perennial, horizontal, long, somewhat flatted, crooked, and full of joints or rings, whence the radical fibres or roots spring from the underside. It is from half an inch to one inch in thickness; externally, when fresh, of a greenish yellow colour, internally whitish and spongy. The leaves spring directly from the root; are sword-shaped, about three feet in length, and generally waved along one of the edges; of a bright green colour, and emitting a strong aromatic odour when bruised. The flowers are hermaphrodite, surrounded with scales, small, and produced on a very close, tessellated, conical spadix four inches long, pushed out from the side of a naked stalk or scape, two-edged, and terminating above the spadix like a leaf. They have no calyx. The petals are six, small, erect, regular, with the apex inflected, and of a pale green colour. The filaments are alternate, with the petals, thread-like, supporting double anthers. The germen is elliptical, crowned with a sessile-pointed stigma: the fruit is baccate, but juiceless.

The rhizomes brought from Norfolk are equal in quality to those imported from the Levant.[2]

Qualities.— The rhizome of sweet-flag has a pleasant aromatic odour, similar to that of a mixture of cinnamon and allspice; the taste is warm, bitterish, pungent, and aromatic.[3] In the dried state the cuticle is corrugated, of a yellowish brown colour, with many small, white, elevated circles on the under side, whence the radical fibres issued. It breaks with a short rough fracture; is internally of a pale rosy-buff colour, its texture is spongy: both the smell and taste are lessened by exsiccation. The aromatic principle is a *volatile oil*, which can be obtained by distillation. According to Volter and Dann, 14 lbs. of the dried rhizomes yield ℥ xxij of volatile oil. According to Trommsdorff, it exists in combination with *soft resin, gum, extractive, fecula, chloride of potassium,* and *phosphate of potassa*[4] The bitter extractive, gum, and fecula, which resembles inulin, with a small proportion of oil, are extracted by infusion in boiling water. The rhizomes contain a considerable quantity of fecula, which is dissolved in the infusion, and rendered evident by tincture of iodine; the gum is copiously precipitated from it by the acetates of lead, whilst nitrate of silver is thrown down as a chloride.

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[1] In the rivers of Norfolk plentiful. On Hillingdon Common, Middlesex, and other places about London.—*Smith,* l. c.

[2] They are much employed by brewers to lessen the quantity of hops requisite in beer.

[3] Linnæus erroneously considered it the only native aromatic plant of northern climates.—The candied root is employed at Constantinople as a preservative against epidemic diseases.

[4] *Gmelin's Handb. d. Chim.*

Medical properties and uses.— This rhizome is tonic and aromatic. It has been employed in medicine since the time of Hippocrates.[1] By the moderns, it has been successfully employed in intermittent fever, even after bark has failed; and it is a very useful addition to cinchona. The dried root powdered is much used in Norfolk. It is also an appropriate adjunct to bitters, and stomachic infusions, in cases of dyspepsia; particularly when vertigo is one of the symptoms. It is too seldom prescribed. The dose in powders is from gr. x to ʒ j.: and of the infusion made with ʒ vj. of the bruised rhizome in f ℥ xij. of boiling water, a cupful may be given three or four times a day. A *tincture* made with ℥ ij. of the bruised rhizome and f ℥ xij. of spirit (sp. gr. 900), is used on the Continent. (*Pharm. Bor.*)

ADEPS. Vide *Sus Scrofa.*
ADEPS OVILLUS. Vide *Ovis Aries.*
ÆRUGO. Vide *Cupri Diacetatis impura.*
ÆTHER, *Lond.* Vide Preparations, *Æther Sulphuricus.*
ÆTHER NITRICUS. See Preparations.
AGATHOTES. See *Chirayta* or *Chiretta.*

ALLIUM. *Spec. Plant. Willd.* ii. 63.

Cl. 6. Ord. 1. Hexandria Monogynia. *Nat. Ord.* Liliaceæ.

G. 626. *Calyx* and *Corolla* confounded, six-parted, spreading. *Spathe* many flowered. *Umbel* heaped together. *Capsule* superior.

* *Stem-leaves plane. Umbel bearing a capsule.*

** *Stem-leaves plane. Umbel bulbiferous.*

Species 14. Allium *sativum.* Garlic. *Med. Bot. 3d edit. t.* 256. *Hayne,* vi. 6.

**** *Leaves radical. Stem naked.*

Species 43. Allium *Cepa.* The Onion.

1. ALLIUM SATIVUM.[2]

Officinal. ALLIUM, *Edin.* BULBUS. Garlic.

Syn. Ail (*F.*), Knoblauch (*G.*), Aglio (*I.*), Ajo sativo (*S.*), Alho (*Port.*), Knoflook (*Belg.*, *Dut.*), Kvidlögen (*Dan.*), Hwitloken (*Swed.*), Czosnek (*Polish*), Tschesnok (*Russ.*), Seer (*Pers.*), Soom (*Arab.*), Bawang (*Jav.*), Lasûna (*San.*), Lehsen (*H.*), Vullay poondoo (*Tam.*), Bavangpootie (*Malay*).

Garlic is a perennial bulbiferous plant, found wild in Sicily, and cultivated in most parts of Europe for culinary and medicinal use. It flowers in July.

The bulbs of this species of Allium are aggregate; three or more being enclosed in one covering, forming a nucleus, round which others are disposed, and the whole enveloped in a common membrane, from the base of which proceed long white fibrous roots. The flower stem rises two feet in height, surrounded with many long, flat, linear, entire, grass-like leaves, and terminated by a globose bulbiferous umbel, enclosed in an ovate rounded spathe.

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[1] *Morb. Mul.* ii. 951.

[2] Σκόροδον Theophrasti et Dioscoridis.

The flowers are small, consisting of six oblong white petals, with tapering filaments, shorter than the corolla, and supporting erect anthers; the ovary is superior, short, angular, bearing a subulate style with a simple stigma. The capsule is three-celled, three-cornered, containing black angular seeds.

Garlic is dug up for use in the month of August: it is then cleaned and dried in the sun, and preserved in bunches in a dry place. In this state the exterior membrane is of a dirty white colour, and of a withered aspect; but the bulbs, which are called *cloves*, are white, succulent, and juicy. On drying they lose nine parts in fifteen of their weight.

Qualities.—All the parts of the plant, but particularly the bulbs, have a pungent offensive odour, and an acrid biting taste. These properties depend on a volatile oil, which can be obtained separate by distillation with water. It is of a yellow colour, heavier than water, soluble in alcohol, and possessing, in an eminent degree, the sensible qualities of the garlic. This oil contains sulphur in its composition, and has been represented as a sulphuret of Allyle $C_6 H_5$, S. It blisters the skin when applied to it, and strikes a black colour when triturated with oxide of iron. The acrid principle is obtained also by expression: it is in a less degree extracted by water, by alcohol[1], and by acetic acid; it is destroyed by boiling in water. The odour is so penetrating that, when garlic is applied to the soles of the feet, it is perceived in the breath, the urine, and the perspiration. Besides this oil, garlic contains albumen, gum, sugar, extractive, woody fibre, alkaline and earthy salts and water.

Medical properties and uses.—Garlic is stimulant, diaphoretic, expectorant, diuretic, and tonic, when exhibited internally, and rubefacient when externally applied.

It has been successfully administered in intermittents, and in fevers of the typhoid type. If the body be kept warm during its use, it acts powerfully by diaphoresis. It has long been esteemed a valuable remedy in asthma, chronic catarrh, flatulent colic, calculus, and dropsies, and as a preventive of worms. Externally it is applied bruised to the soles of the feet, in the coma of typhus; and in confluent small-pox, when the determination to the head is considerable. A poultice made of it is a good resolvent of indolent tumours. A clove of it, wrapped in cotton or gauze, or a few drops of the juice introduced into the external ear, prove efficacious in atonic deafness; and applied to the pubis as a poultice in retention of urine, owing to a want of action in the bladder, it sometimes is effectual in stimulating that viscus to discharge its contents. The juice is also applied, united with oil, to herpetic eruptions.

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[1] With alcohol, a reddish yellow tincture is obtained, which leaves, when evaporated, a very acrid brown extract, that attracts moisture from the air.

Garlic may be exhibited in substance, the whole clove or pieces of it being dipped in oil and swallowed; or it may be formed into pills. The expressed juice also is given mixed with sugar; or the bulb may be infused in milk, which was Rosenstein's mode of administering it to children afflicted with worms. It is sometimes united with calomel in the form of pill or bolus, in dropsical cases. An ointment is formed by mixing the juice with oil. The bruised bulb has also been used as a suppurative.

The dose, in substance, is from ʒ ss. to ʒ ij.; or from one to six cloves, swallowed whole, twice or thrice a day; and in pills, united with soap or calomel, from grs. xv. to ℈ j. Of the juice, ʒ ss. is given for a dose in any proper vehicle.[1]

An over dose, or the too liberal use of it as a condiment, is apt to occasion headache, flatulence, thirst, fever, inflammation, and discharges of blood from the hæmorrhoidal vessels. The expressed juice has proved fatal.[2]

2. ALLIUM CEPA.[3]

BULBUS. The bulb of the Onion. Formerly officinal in the Dublin Pharmacopæia.

Syn. Ognon (*F.*), Zwiebel (*G.*), Uijen (*Dutch*), Cipolla (*I.*), Cebolla (*S.*), Cebola (*Port.*), Lögen (*Dan.*), Rödlök (*Swed.*), Cebula (*Pol.*), Luck (*Russ.*), Vungayum (*Tam.*), Loong (*Cyng.*), Pecaz (*Pers.*), Bavangmera (*Malay*), Palandoo (*Sam.*), Pecáj (*H.*), Bassul (*A.*), Kanda (*Sans.*), Brangbang (*Jav.*), L'Vussel (*Bernouse*), Bussara (*Begharmi*).

The onion is a biennial, bulbiferous plant, a native of Egypt, cultivated all over Europe for culinary purposes; flowering in June. It is so well known, as scarcely to require a particular description. The bulb is simple, formed of concentric circles, with a radical plate at the base, and fibrous roots. The stem is a naked, swelling scape, with fistular, pointed, spreading leaves, sheathing at the base. The flowers are produced in a globose capsuliferous head, enclosed in a deciduous spathe: they are whitish.

Qualities.—The odour and taste of the onion do not materially differ from those of garlic, but are much weaker. The acrid principle is so volatile, that when the bulb is cut it affects the eyes to tears. An acrid, volatile oil is obtained by distillation, which has a composition similar to oil of garlic, containing sulphur (a sulphuret of allyle)[4]; and the recent juice contains also *sugar*, *gum*, *phosphoric* and *acetic acids*, *phosphate of lime*, and *citrate of lime*.[5]

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[1] Its use as a condiment is of great antiquity. Thus, when the Israelites remembered the flesh-pots of Egypt, among other deprivations, which the malcontents enumerated, were "the leeks, and the onions, and the garlic."—*Numbers*, c. xi. v. 5.

[2] Puihn.

[3] Κρόμυον Dioscoridis. The specific appellation is derived from *caput*, a head, on account of the form of its bulb.

[4] It is this sulphuretted oil which blackens silver plate in which onions are placed, and which occasions the disagreeable odour of this bulb in putrefying.

[5] Fourcroy and Vauquelin, *Ann. de Chim.* lxv. 161.

Medical properties and uses.—The onion, "considered as an article of food, when eaten liberally, is said to produce flatulencies, occasion thirst, headache, and turbulent dreams." As a medicine it is stimulant, diuretic, and expectorant, and may be used in the same cases as garlic. On account of the free phosphoric acid it contains, the juice is supposed to be useful in calculous cases, as it dissolves phosphate of lime out of the body. Onions are, however, scarcely ever employed, except externally, as suppurative cataplasms; for which purpose they are generally roasted, split, and applied to tumours.

ALOE. *Spec. Plant. Willd.* ii. 184.

Cl. 6. *Ord.* 1. Hexandria Monogynia. *Nat. Ord.* Liliaceæ.

G. 659. *Corolla* erect, mouth spreading, bottom nectariferous. *Filaments* inserted into the receptacle.

Species 2. Aloe *spicata:* Spiked Aloe. *Nees Von Essen.* 51. *De Candolle, Plant. Succ.* 85.

——— 3. Aloe *vulgaris.* Common Aloe. *Sibthorp. Flor. Græc.*

1. ALOE SOCOTRINA.[1]

Officinal. ALOE SOCOTRINA, *Lond. Edin.* Socotrine Aloes. The juice of the cut leaf of uncertain species of Aloes, hardened by air.

Syn. Suc d'Aloes (*F.*), Glausinde Aloe (*G.*), Azevre Succotrina (*Port.*), Aloe (*I.*), Aloe (*S.*), De doorblādige Aloe (*Belg.*), Aloe (*Dut. Swed. Dan.*), Saburobiknovennai (*Russ*), Elwa (*H.*), Sibbir (*Pers.*), Musebber (*A.*), Corriabolum (*Tam.*).

The spiked aloe, Aloe *spicata,* is undoubtedly the species which yields the best extract brought from the Cape of Good Hope; and it is also supposed to yield the extract brought from the island of Zocotora[2], or Socotora; which was formerly the only place of export for the best aloes, hence named Socotrine aloes. De Candolle, however, refers the Socotrine aloes to a distinct species, which he terms Aloe *Socotrina.*

The Aloe *spicata* grows abundantly in the interior of the Cape, particularly at Zwellendam, near Mossel Bay; and in the kingdom of Melinda, whence the best aloes are brought. The stem is round, about four inches in diameter, leafy at the top, and rising three or four feet in height. The leaves are spreading, about two feet long, subverticillate, broad at the base, gradually drawn to a point, channelled, acute, with remote teeth. The flowers spread horizontally on a very close spike about a foot in length. Under each flower is a single ovate, acute, broad, membranaceous bracte, white, with three green streaks, and a little shorter than the corolla, which is bell-shaped, and six-petalled: the three inner segments are white, marked with three green lines, not connected together, ovate, blunt, and broader than the three outer; which are connected with them

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[1] Ἀλόη Dioscoridis? It is probable from the researches of Dr. Sibthorpe, that the only aloe of the ancients, medicinally used, was the A. *vulgaris.*

[2] Zocotora is an island subject to the Prince of Hadramaut, an Arabian province contiguous to Yemen.

at the base, and resemble them, but are narrower and less concave. The flower contains a large portion of a purple honey-juice. The seeds, which are numerous, with a membranaceous appendage attached to each, are contained in a superior capsule.

The Aloe *Socotrina*, according to De Candolle, has a more woody stem, with amplexicaul leaves, uniform, concave above, and curved inward at the apex, and marked with small marginal serratures. The flowers, which are scarlet at the base, green at the lip, and pale in the centre, are supported on a branched cylindrical raceme. The stamens are of unequal length, three being longer than the flower.

The juice of the aloe flows readily from the leaves, whether they are cut or torn from the plant; and both at Socotora and at the Cape it is received in a skin, generally placed in a shallow pit, dug for the purpose.

At the island of Socotora the leaves are cut or torn off close to the stem, and the juice allowed to run out, and to remain at rest for forty-eight hours, during which time a feculent matter is deposited: after which the supernatant liquor is poured off into flat dishes, and evaporated in the sun. At Bethelsdorp, near Algoa Bay, in the month of July, the leaves are pulled, then piled on the skins to a variable height, and left for a few days. The juice is then collected from the skins into buckets, put into an iron pot to evaporate by the aid of fire, and constantly stirred during the process. The thickened juice is next thrown into wooden cases, or into goat or sheep skins, in which it thickens sufficiently for the market. Different species of aloes are employed.

The real Socotrine aloes, which are rather scarce in the market, were formerly brought to this country, by way of Smyrna and Malta, in chests and casks; but the greater part of what are now sold as Socotrine aloes are brought from Bombay and Madras. Socotrine aloes are often confounded with East India aloes; and much of those sold as Socotrine, are prepared in the kingdom of Melinda. The Bombay or East Indian aloes are rather duller and browner, but in other respects have nearly the same characters as the Socotrine, which are sometimes mixed with the Indian. They are imported in iron-bound kegs, containing from two to eight hundred weight, and sometimes in skins.

Qualities.—The real *Socotrine* aloes vary in colour, from garnet to golden red; they have a peculiar aromatic odour, not unlike that of the russet apple decaying, which is developed when the specimen is breathed upon, or heated: the taste is a very permanent intense bitter. The pieces break with a smooth glassy conchoidal fracture; and the edges, or thin portions, are nearly translucent: they are reddish, or golden yellow, when examined with transmitted light. Socotrine aloes soften in the hand, and are adhesive; yet sufficiently pulverulent. The powder has a

bright golden yellow hue. According to the London and Edinburgh Colleges, this kind of aloes is brittle, of a reddish brown or garnet colour, of an aromatic odour; in thin lamina is transparent, and is soluble in spirit of the strength of sherry.

ALOE HEPATICA, *Lond. Dub.* ALOE INDICA, *Edin.*—Hepatic or Indian Aloes. Extract or inspissated juice of uncertain species of aloes.

These aloes are brought from Bombay and Madras in iron-bound kegs or casks. They differ from Socotrine in being more opaque, of a liver brown colour, less agreeably fragrant, and less brittle; and weak spirit leaves much undissolved matter. They are probably derived from the same source as the Socotrine Aloes. The colour of the powder is less bright than that of the former.

ALOE CAPENSIS or CAPE ALOES (not officinal). They have a stronger and more disagreable odour than the Socotrine or the Hepatic, but the taste is nearly the same. The outside of the pieces is of a deep brown hue, with a tint of green. The fracture is glossy. It is more friable. The colour of the powder is a beautiful greenish yellow, resembling gamboge, but less bright. They are imported in chests from the Cape of Good Hope, and are derived from the Aloe spicata, also from several other species.

2. ALOE VULGARIS.[1]

Officinal. ALOE BARBADENSIS, *Lond. Edin.* The inspissated juice of the cut leaf of Aloe vulgaris, *Lond.* Extract or inspissated juice of one or more undetermined species of Aloe, *Edin.*

The British Pharmacopœias formerly considered the plant which yields the Barbadoes aloes as a variety of the Aloe *perfoliata;* but Sir E. Smith, the learned editor of Sibthorpe's *Flora Græca*, has marked the above-named plant, which is a distinct species, as the one that Sloane describes, in his History of Jamaica, as producing the Barbadoes extract: an observation which has since been verified by Dr. J. D. Maycock, of Barbadoes. The Aloe *vulgaris* has a simple, short, cylindrical stem, with fleshy, amplexicaul leaves, glaucous, with reddish distant spines, at right angles with the margin. The flowers are in a cylindrical-ovate spike, on an axillary, branched scape; they are yellow, at first erect, but afterwards pendulous. This aloe is a native not only of Barbadoes, but is found in the East Indies, Italy, Sicily, and Malta.

The month of March is the period for cutting the aloes in the island of Barbadoes. The leaves are cut off close to the stem, and disposed in tubs, in such a manner that the juice runs out. After a sufficient quantity of it is collected, it is exposed to heat

[1] Ἀλόη Dioscoridis, l. 3. c. 25.

in copper boilers; and, as it becomes more inspissated by a constant and regular fire, it is ladled from one boiler to another, and fresh juice added, until that in the last, which is called the *teache*, acquires the consistence of honey: it is then poured into calabashes, and hardens by age. It is brought from Barbadoes and Jamaica in these calabashes, or large gourd-shells, each of which contains from sixty to seventy pounds weight. They are often passed off as Socotrine aloes.

Qualities.—The odour of the Barbadoes aloes is stronger and less pleasant than that of the Socotrine, and has some resemblance to the odour of the human axilla. The taste is nauseous, and intensely bitter. The pieces are also of a deeper brown colour, less glossy, not so smooth in the fracture, but they easily splinter. The edges are not so sharp and transparent as the Socotrine or the Cape aloes, but rather blunt, and of a dull yellowish hue. Barbadoes aloes soften in the hand, and are adhesive. The colour of the powder is a dull olive yellow.

An inferior aloes, named Caballine or Fœtid aloes, supposed to be an inferior Cape aloes, is sometimes found in commerce; also a variety named Aloe Mocha, resembling bad East Indian or Barbadoes aloes.

All aloes, when analysed, yield a small portion of vegetable albumen and resin, and a peculiar bitter extractive matter. Braconnot found aloes to consist of 73 per cent. of a peculiar bitter principle, *resino amer*[1]; and 26 of a coloured principle, *principe puce:* Bouillon, Lagrange, and Vogel, consider that aloes contain *extractive* in the proportion of 52 per cent. in Barbadoes and 68 in Socotrine aloes; and 42 of *resin* in the former, and 32 in the latter; with 6 per cent. of *albumen* in Barbadoes, but none in Socotrine aloes.[2] Winkler found the same principles, but in different proportions.[3] The odour, taste, and medical virtues of the drug reside chiefly in the extractive; and the superiority of the Socotrine, the Cape, and the Bombay aloes is supposed to arise from their containing a larger proportion of it than the Barbadoes. Boiling water dissolves nearly the whole of any of the kinds; but as the solution cools, a portion is deposited; and by boiling aloes in water the extractive is altered, rendered nearly insoluble, and thus approaches in its properties the nature of resin. The alkalies and their carbonates greatly assist its solution. All kinds dissolve, also, in proof spirit. When the Socotrine aloe is distilled, a volatile oil is obtained, which is not procured from the Barbadoes; but Trommsdorff found albumen in this variety, and not in the Socotrine aloes. Pfaff examined the extractive, which he calls *Aloesin*, and ascertained the following as its cha-

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[1] *Ann. de Chimie*, lv. 152. 1817. [2] *Ibid.* lxviii. p. 11.
[3] Geiger, *Hand. d. Pharm. Bot.* ii. 782.

racters:—It is a brown bitter mass, soluble in water, less so in proof spirit, and nearly insoluble in alcohol and in ether. I have found that it imparts a bluish green colour to litmus paper reddened by an acid. It is deepened in colour by alkalies, rendered paler by acids, and clarified by alum. It is precipitated by protonitrate of mercury and acetate of lead; and scantily by nitrate of silver and nitrate of lead. Persulphate of iron deepens the colour of the solution, but throws down no precipitate. It is not affected by tincture of galls, chloride of tin, tartar emetic, or solutions of the salts of copper, of zinc, or of manganese. It is a compound of *carbon, hydrogen, oxygen*, and *nitrogen*. Messrs. Smith, of Edinburgh, have recently obtained from aloes a crystalline *principle* which they name *Aloine;* it was first procured from Barbadoes aloes, but they find it also in the other varieties. It is made by concentrating a watery solution of the aloes in vacuo, and allowing the aloine to crystallize slowly. Besides this body, aloes contain a species of resin, which is probably formed by the action of the air upon the aloine: which differs considerably from ordinary resin, inasmuch as it is soluble in boiling water, as well as alcohol, ether, and alkaline solutions. When aloes are acted upon by nitric acid several compounds are formed:—an acid called *Polychromic*, whose solution has a purple colour; Chrysammic acid, $C_{15}\ H\ N_2\ O_{12}$, $H\ O$, whose salts have a red colour; Chrysolepic (Carbozotic) acid, $C_{12}\ H_2\ N_3\ O_{13}$, $H\ O$, crystallizing in golden scales.

Trommsdorff supposed that he had detected gallic acid in aloes; but the acid differs from that acid in several respects; and Dr. Pereira has named it *aloesic acid.*

Medical properties and uses.—Although all the kinds of aloes differ in their sensible qualities, yet they agree in their medical properties. In large doses, they are warm, stimulating cathartics, of slow solution; and, in small doses, they operate as tonics. As purgatives, they act chiefly on the colon and rectum. By the extension of their stimulus to the uterine vessels, they produce, also, emmenagogue effects. Their operation is slow and moderate, but certain. It does not depend on any direct topical influence on the intestinal canal, as purging is equally the result of applying aloes to ulcers, blisters, or any denuded surface. From my own observations, I am inclined to think that they act first on the duodenum, and afterwards on the rectum. It is their primary action which renders them serviceable in jaundice.

From the stimulant property of aloes, they are useful in cases where the intestines are in a sluggish, relaxed, and insensible state, attended with viscidity of the abdominal secretions; as in the habitual costiveness of the sedentary and hypochondriacal, or that torpor which arises from a paucity of bile, in jaundice, chlorosis, and scrofula: and as the rectum participates in their action on the colon, they have been found very serviceable in expelling ascarides.

Their effect upon the rectum is more owing to the manner of prescribing the remedy, than any specific action which it exerts on that portion of the intestines which is but little affected when the aloes are prescribed in a soluble form. They are generally thought to be improper in very irritable and plethoric constitutions, in phthisis pulmonalis, and during the flow of the menses. Aloes and aloetic compounds have been likewise regarded as improper in pregnancy; but Dr. Denman has justly remarked, that "they are in common use among the lower class of people, because they are cheap, and conveniently given in the form of pills;"[1] and no bad effects are observed to follow. Their value has been well ascertained in habitual costiveness, especially when large fæcal accumulations occur in the rectum.

Aloes may be given in substance, in doses from grs. ij. to grs. x. larger doses not operating more effectually. Whether in the simple state, or when compounded with soap, bitters, metallic salts, and other substances, the form of pill is to be preferred, on account of the nauseous taste of the medicine.[2]

Officinal preparations.—*Pulvis Aloes comp.* L. *Pilulæ Aloës*, E. *Pil. Aloës comp.* L. D. *Pil. Aloës cum Myrrha*, L. E. D. *Pilul. Aloës et Assafœtidæ*, E. *Pil. Aloës et Ferri*, E. *Pilul. Aloës cum Sapone*, L. *Extractum Aloës*, L. *Extractum Aloës Barbadensis*, L. *Extractum Aloës aquosum*, D. *Tinctura Aloës*, L. E. *Tinct. Aloës comp.* L. *Tinct. Aloës et Myrrhæ*, E. *Tinct. Rhei et Aloës*, E. *Vinum Aloës*, L. E. *Decoctum Aloës comp.* L. D. *Decoctum Aloës*, E. *Enema Aloës*, L.

ALPINIA. *Roxburgh. Plant. Corom.*

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. Ord.* Zingiberaceæ.

Species A. *Cardamomum.*[3] The Cardamom-tree. *Van Rheede* (Elettari). *Hort. Malabar*, vol. ix. *t.* 4, 5. *Linnæan Trans.* vol. x. part 2d. *Roxburgh, Ind.* p. 3. N. 226. *Asiatic Res.* vol. xi. p. 335. *Roscoe, Monand.* fol. 38.

Officinal. CARDAMOMUM SEMINA, *Lond. Edin. Dub.* Lesser Cardamom-seeds. Seeds of *Elettaria.* ALPINIA CARDAMOMUM. Fruit of *Renealmia Cardamomum.*

Syn. Petit Cardamome (*F.*), Kleine Kardamomen (*G.*), Kardamom (*Dutch*), Kardamomer (*Dan.*), Kardemumma (*Swed.*), Cardamomo (*I.*), Cardamomo minor (*S., Port.*), Kardamon (*Russ.*), Ebil (*Arab.*), Purbi and Guzrate Clachi (*H.*), Ela (*San.*), Kapol (*Javanese*), Yaylersie (*Tam.*), Capulaga (*Malay*), Pooah (*Sumatra*), Kakeleh seghar (*Pers.*).

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[1] *Introduction to Midwifery*, vol. i. 287.

[2] Dr. Paris (see *Pharmacologia*) has enumerated the following empirical preparations as owing their efficacy chiefly to the aloes they contain. *Anderson's pills*, consisting of aloes, jalap, and oil of aniseed; *Hooper's pills*, formed of Pil. Aloes c. Myrrha, sulphate of iron, and Canella bark; *Dixon's antibilious pills*, a compound of aloes, scammony, rhubarb, and tartar emetic; *Speediman's pills*, of aloes, myrrh, rhubarb, the extract and the essential oil of chamomile; and *Lady Webster's dinner pills*, for which the following is the formula, extracted from the old Paris codex:—℞. Aloes optimæ, ʒ vj. mastiches, et rosarum rubrarum, āā ʒ ij. syrupi de absinthio q. s. ut fiat massa, in pilulas 120 dividenda.

[3] Καρδάμωμον Hippocratis.

The plant which produces these seeds is a native of India, growing on the mountains above Cochin and Calicut, in shady places, on the declivities, and in the valleys; and it is extensively cultivated in Malabar. It is referred by Dr. Roxburgh to the genus *Alpinia:* but more lately, by Roscoe, to *Renealmia.* The London and Dublin Colleges regard cardamoms as the seeds of Elettaria *Cardamomum;* the Edinburgh prefers Roscoe's name, Renealmia *Cardamomum.*

The cultivated plant does not flower till it is four years old. It rises from six to twelve feet in height. The rhizome is oblong, jointed, tortuous, of a whitish colour, and sending off numerous flexuous fibres. The stems are simple, erect, reed-like, round, smooth, and the thickness of the human thumb. The leaves are bifurcous, sheathing, elliptico-linear, about two feet and a half long, and four inches in breadth, green and striated with parallel veins, villous above, silky beneath, and having a strong subacrid, aromatic taste and odour. The flowers are in racemes, which are sent off from the rhizome or underground stem, which creeps along the ground. They are furnished with oblong bracts at each joint of the scape. The calyx is monophyllous, inferior, small, funnel-shaped, divided into three obtuse teeth at the margin, and permanent: the corolla is monopetalous, tubular, and four-cleft, the three outer segments being long, narrow, and of a straw-green colour, and the central one white, tipped with pink and purple-violet stripes; large, broad, concave, and irregularly oval. The filament is short, erect, slightly grooved, supporting a large, double, emarginate, crestless anther, having a deep fissure between its lobes, to receive the style, which is slender, and bearing a funnel-shaped ciliated stigma. The capsule is an oval, somewhat three-sided, smooth pericarp, trilocular and trivalved, containing eighteen to twenty-seven hard, horny obtusely wedge-shaped seeds.

The cardamoms of the Wynand, the best found in commerce, are gathered in November; and the capsules, which are dried in the sun, or over a gentle and slow fire, change as they dry from green to a whitish-straw colour, and become thinner: whilst the permanent calyx and foot-stalk are detached by rubbing them between the hands.[1] A rainy season is fatal to the crops, owing to the racemes lying on the ground.

Cardamoms are brought to this country in cases, each containing about 120 lbs. weight. For the purpose of preserving them, they are kept in the capsules, which are from 3 to 10 lines in length, and from 3 to 4 lines in breadth, obtusely triangular, coriaceous,

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[1] In gathering the fruit, the fruit panicles are plucked up by the roots; and the pods, being stripped through the fingers, are sorted into three classes: 1. Valli Kai, or head fruit; 2. Nadu Kai, middle fruit; 3. Poulo Kai, abortive fruit.—*Linn. Trans.* x. p. 229.

striated, and of a pale, clear straw-colour. There are three kinds of cardamoms known in commerce: the 1st has a small capsule, not very triangular, and plump; it is the most esteemed, and is known under the name—*shorts:* the 2d larger, both in length and breadth, and more triangular than the former, called—*short-longs:* and the 3d more than three-quarters of an inch long, 2 to 3 lines broad, sharply triangular; elongated and accuminate; pale and more finely ribbed than the former sorts — *long-longs.*

Qualities.—Cardamom seeds, which are rough and of a brown colour, have an agreeable, aromatic, camphoraceous odour, and a warm spicy taste. They are easily separated from the capsule, and are pulverulent. According to Trommsdorff they contain 4·6 of *volatile oil;* 10·4 *fixed oil;* 2·5 *of colouring matter, with a salt of potassa;* 3·0 *fecula;* 1·8 *azotized mucilage* and *phosphate of lime;* 0·4 yellow colouring matter; and 77·3 *lignin* = 100·00.[1] Water, alcohol, and ether extract their virtues; the two latter most completely. The watery infusion has a turbid appearance; and lets fall flocculent precipitates on the addition of alcohol, the acids, solutions of salts of iron, bichloride of mercury, and acetate of lead; but the sulphate of iron does not alter its colour. The alcoholic tincture is rendered milky by water. The ethereal tincture has a yellowish-green hue, and, when evaporated on the surface of water, it leaves neither resin nor extractive; and only a considerable portion of essential oil, which has the flavour and taste of the seeds in perfection. Cardamoms owe any medicinal virtue they possess to the *volatile oil* which they contain. Dr. Pereira states, from private information, that about six and a half drachms of this oil were obtained from good Malabar cardamoms, which is colourless at first, but becomes yellow; sp. gr. 0·943, hot taste and has a composition analogous to that from lemons or turpentine ($C_{10}\ H_8$).

Medical properties and uses.—Cardamom seeds are carminative and stomachic. They are less stimulating than pepper; and are therefore used, united with rhubarb and magnesia, in the flatulent colic of children; and as a grateful addition to bitters in dyspeptic and gouty affections of the stomach: but they are principally employed to give warmth to other remedies.

The dose in powder is from grs. vj. to ℈ j.[2]

Officinal preparations.— *Tinctura Cardamomi,* E. *Tinct. Cardamomi composita,* L. E. D.

ALTHÆA.[3] *Spec. Plant. Willd.* iii. 770.

Cl. 16. *Ord.* 8. Monadelphia Polyandria. *Nat. Ord.* Malvaceæ.

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[1] *Journ. de Chim. Méd.* t. i. p. 196.

[2] Dr. Pereira has published an instructive paper on the Ceylon Cardamom, C. *Elettaria major* of Smith, Alpinia *granum Paradisi* of Moon, Ensal of the Singhalese.—*Pharmaceutical Journ.* vol. ii. p. 384.

[3] Ἀλθαία Dioscoridis. Named from Althea, the mother of Meleager.

G. 1289. *Cal.* double; the exterior 6 or 9 cleft. *Caps.* numerous, 1-seeded.

Sp. 1. A. *officinalis.* Common Marsh Mallow. *Med. Bot. 3d edit.* 552. *t.* 198. *Eng. Bot. t.* 147. *Smith's Flora Britan.* 3. 739. *Hayne,* ii. 25.

Officinal.—ALTHÆÆ RADIX, *Lond.*—FOLIA, RADIX, *Edin.* The leaves and root of Marsh Mallow.

Syn. Guimauve (*F.*), Gemeine eibisch wurzel (*G.*), Gemeene heemst (*Dut., Belg.*), Ibisk root (*Swed.*), Altea (*Dan.*), Slaz wielkilesny (*Polish*), Proswirujak aptetschkoi (*Russ.*), Altea, Malva-vischio (*I.*), Malvavisco (*S.*), Malvaisco (*Port.*).

The marsh mallow is an indigenous, perennial plant, which grows, as its name imports, in marshy places, particularly salt marshes, and on the banks of rivers throughout Europe. It flowers in June and July, and ripens its seed in September. The root is fusiform. The stems are annual, herbaceous, upright, rising from two to five feet in height, round, naked, and purplish below, but leafy, branching and greenish above. The leaves are alternate and petiolate, longer than they are broad, slightly five-lobed, and unequally serrated: both surfaces are downy, and give a soft velvety feeling when rubbed between the fingers. The flowers are on short thick axillary panicles. Both the calyxes are persistent: the exterior has 7, 9, 10, or 12 very narrow unequal divisions; the interior is more regularly, but less deeply, cleft into five broader and sharper segments. The petals are five, cordate, coalescing at their bases, of a palish blush colour. The stamens are many, united at their bases into a tube, and support reniform anthers. The germen is orbicular, bearing a cylindrical style, divided into many stigmas, which rise above the anthers. The capsules, generally about twenty in number, are of a rounded kidney shape, united laterally in a circle, so as to form a flattened wheel-shaped seed-vessel; and each contains a solitary, reniform, flattened, smooth, brown seed. The roots, which are also medicinally used, are dug up in autumn, from plants not less than two years old.

Qualities. — The leaves of the marsh mallow are inodorous and mucilaginous when chewed; the roots are externally tough and of a yellowish brown colour, internally white and fibrous; and contain a very considerable portion of saccharine mucus, which is yielded to water by coction. They also contain *asparagine,* or *altheine,* a highly nitrogenized principle, contained in many other plants, as the asparagus, liquorice, vetch, common pea, &c. It can be obtained from the root of the althæa, by macerating it with cold water, to which some milk of lime has been previously added, then removing the excess of lime with carbonate of ammonia, and afterwards evaporating, when the altheine is deposited in the form of brilliant, transparent, colourless crystals, which are soluble in water; and the solution has a faint taste, but neither acid or alkaline reaction. This body undergoes many interesting decom-

positions when subjected to different influences; by alkalies it is resolved into aspartic acid and ammonia, by fermentation into malic, succinic acids, &c. Its formula is $C_8\ H_8\ N_2\ O_5$.

Medical use. — The preparations of this plant, which derive their virtues from its mucus, are useful demulcents in visceral inflammations, calculous complaints, and all affections of mucous membranes, bronchitis, gonorrhœa, catarrhus vesica, nephritis, dysentery, and diarrhœa. The roots, well boiled and bruised, are sometimes used as an emollient suppurative cataplasm; and a decoction of the leaves forms a useful fomentation in external abrasions, and in cutaneous eruptions accompanied with a sharp ichorous discharge.

Officinal preparations. — *Misturæ Althææ,* E. *Syrupus Althææ,* L. E.

ALUMEN. *Lond. Edin. Dub.* Alum. Sulphate of Alumina and Potash.

Syn. Alun (*F.*), Alaun (*G.*), Aluin (*Dutch*), Allun (*Dan. Swed.*), Halun (*Polish*), Kvastsi (*Russ.*), Allume (*I.*), Alumbre (*S.*), Pedrahume (*Port.*), Sp'hatica (*San.*), P'hitcari (*H.*), Sheb (*Arab.*), Paddicarum (*Tam.*), Zajbelur (*Pers.*).

This salt is a compound of alumina, potassa, and sulphuric acid, a double sulphate of alumina, potassa, and water. It is found native in some places, either effloresced on bituminous schistus, as at Göttwig in Austria; or united with the soil in volcanic regions, as at the Solfatara near Naples, where the only processes requisite for its extraction are lixiviation and evaporation.[1] But the greater quantity of the alum of commerce is prepared by a peculiar management of schistose pyritic clays, usually denominated alum ores, aluminous shale, and schist. At La Tolfa, near Civita Vecchia, where the best Roman alum is made, the ore is *alum stone,* found in large stratified masses among compact iron-shot argillaceous limestone[2]; but at other places, both on the Continent and in Great Britain, it is manufactured from *pyritaceous clay,* which is in black, hard, brittle masses; *volcanic aluminous ores,* a white saline earth; and *shale alum slate,* which occurs amorphous, or in concentric balls. At Hurlet and Nitshill near Paisley, the largest alum mine in this country, the schistus lies ten inches thick between coal and lime. But the alum is, in every instance, the result of the decomposition of what is termed its ore, and a subsequent synthetical union of its components.

To prepare the alum, the slate is sometimes, but not always, roasted. At Hurlet it is exposed to the atmosphere, when the sulphur of the sulphuret of iron, present in it, is oxidized by the air and converted into sulphuric acid, which, combining with the alumina and potassa, present in the slate, produces an aluminous

[1] These processes are performed in pans sunk in the ground, the heat of which is sufficient to carry on the evaporation.

[2] An alum is found near Moscow which contains much sulphate of iron.—*Mém. de la Soc. Imp. de Moscow,* t. i. p. 22.

efflorescence. At Whitby, the slate is first calcined with a low heat, so as to destroy the bituminous matter, and partly convert the sulphur into sulphuric acid; the oxidizement is then completed by exposing the roasted slate to air and moisture, by which means a persulphate of alumina is formed, which is extracted by lixiviation. To the solution, concentrated until it acquire the spec. grav. 1·35, is added, when the slate contains no potassa, either impure subcarbonate of potassa of commerce, soap-boilers' ley, or bi-sulphate of potassa, or sulphate of ammonia from the gas liquor, instead of chloride of potassium, after which it is run into coolers to be crystallized. At the end of four days the mother waters are drained off, and the crystals, being washed, are re-dissolved in boiling water to saturation, and then *roched,* that is, run into casks. On taking asunder the casks at the end of sixteen days, the alum exteriorly is found in a solid cake, but interiorly crystallized in large octahedrons, with truncated angles, inserted into one another.

The ancients were probably unacquainted with alum, for the *στυπτηρία* of the Greeks, and the *alumen* of the Romans, were merely vitriolic earths: and the first regular alum-works appear to have been established by the Asiatics, in the middle ages, particularly at Roccha, in Syria, whence probably was derived the name *Roch alum;* and from them Europe was supplied till the fifteenth century. After this period, works were begun at Tolfa and Volterra in Italy, at Oberkaufungen and several other places in Germany, and at Almacoran in Spain. In England, in the reign of Elizabeth, Sir Thomas Chaloner established the first alum-work at Gisborough, in Yorkshire. The largest alum-works at present in this country are those on the estate of Lord Glasgow at Hurlet, and those of Lords Dundas and Mulgrave at Whitby, in Yorkshire.[1] Much alum is also made at Newcastle.

The best Roman alum is in irregular octahedral, crystalline masses, powdery on the surface. It is brought from Trieste and Leghorn. The English is in large, irregular, semitransparent, white masses, having a glassy fracture, not efflorescent, and difficult to pulverize. The Levant, or *Roccha alum,* is in small morsels, about the size of an almond, rather friable, and of a pale rose colour; it is now never imported. The form of the regular crystal of alum is an octahedron; but it is varied by different excesses of alumina: when this is in small excess, the crystals assume a cubical form; when it is great, the crystallization is either prevented, or the crystals are very irregular.

Qualities. — Alum is inodorous, and has a sweetish, acidulous, astringent taste. Its specific gravity is about 1·71. It reddens

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[1] The alum works at Whitby were established in 1600. The ore is alum slate; the stratum is 28 miles; and the cliffs are from 100 to 750 feet in height. One hundred and thirty parts of the calcined slate yield one part of alum.

litmus[1]; is in a small degree efflorescent; and soluble in eighteen parts of water at 60°, and in its own weight of boiling water. When exposed to heat, it undergoes the watery fusion, swells, loses 50 per cent. of its weight, which is water, and becomes an opaque, white, friable, spongy mass. In a very strong heat it is partially decomposed, and loses a portion of its acid. It is decomposed by the alkalies and alkaline earths, which attract the greater part of its acid, and precipitate the alumina united with a small portion of acid and potassa. In the crystallized state its composition is represented by the formula, $KO, SO_3 + Al_2 O_3, 3. SO_3 + 24. HO$. It often contains ammonia; and none of the alum of commerce is wholly free from traces of iron. Gallic acid precipitates alumina; the alkalies and their carbonates, hydrochlorate of ammonia, magnesia, lime, salts of baryta, phosphates, carbonate of magnesia, chalk, tartrate of potassa, and infusions of galls and of cinchona bark, are incompatible in prescriptions with solutions of alum; as are also the acetates of lead, and the salts of mercury. The alumina thrown down by ammonia or potassa is re-dissolved by an excess of the alkalies. Pure alum is entirely soluble in water.

Medical properties and uses.—Alum is a powerful astringent. When applied to any tissue, it renders it pale, owing to the constriction of the blood-vessels, and consequent thickening of their coats. In large quantity, however, this paleness is followed by redness; and to this cause may be attributed some instances of inflammation of stomach and bowels that have followed the internal administration of large doses of alum. It is used both as an internal and external remedy for restraining violent hæmorrhages; and also in cases of obstinate diarrhœa, diabetes, and fluor albus; but we agree with Dr. Cullen, that it is not to be depended upon in the two latter diseases. It has been given as an auxiliary to cinchona in intermitttents, and in confluent small-pox, when the pustules are bloody; and Dr. Percival regarded it as a prophylactic in colica pictonum, and a cure for slighter cases.[2] It is used locally in gargles, in cases of cynanche, relaxation of the uvula, and aphthæ; and as the basis of injections, in cases of gleet and leucorrhœa, and of eye-waters in chronic ophthalmia.

The dose in hæmorrhages is from grs. vi. to ℈ j., repeated every hour or two hours, till the bleeding abate: in other cases, smaller doses are more advisable, larger being apt to nauseate the stomach. The addition, however, of opium or an aromatic prevents it to a certain degree from exciting nausea. It is sometimes administered dissolved in the serum of milk, in the form of whey (*serum lactis*

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[1] Some of the English alum which we have examined strikes a green with syrup of violets.

[2] *Observations on Lead*, &c. See also Gondrin's observ. quoted by Trousseau, *Trait. M. Ther.* ii. 291.

aluminatum), which is prepared by boiling ʒ ij. of powdered alum in a pint of milk, and straining. A small piece of alum, briskly agitated with the white of an egg, forms a coagulum, which, applied between two pieces of gauze or thin rag, proves very serviceable in ecchymosis of the eye, and in some species of ophthalmia. The dose of the whey is f ℥ ij. to f ℥ iij.

Officinal preparations.—*Alumen exsiccatum*, L. E. *Alumen siccatum*, Dub. *Liquor Aluminis comp.* L. *Pulvis Aluminis comp.* E.

AMMONIÆ HYDROCHLORAS, *Lond.* AMMONIÆ MURIAS, *Edin. Dub.* Hydrochlorate or Muriate of Ammonia. Sal Ammoniac.

Syn. Sel Ammoniac (*F.*), Salmaik (*G.*), Salmiaken (*Dan.*, *Swed.*), Sale Ammoniaco (*I.*), Sal Armoniaco (*S.*), Nosader (*H.*), Navacharum (*Tam.*), Urmiena (*Arab.*), Nowshader (*Pers.*), Vayvagarra Loonoo (*Cyng.*), Nuosadur (*Sans.*).

This salt, which is a compound of hydrochloric acid and ammonia, is found as a produce of volcanoes [1]; but the greater part of that which is employed in medicine and the arts is artificially prepared.

Hydrochlorate of ammonia was originally manufactured in Egypt, by sublimation from the soot of fuel, formed by the dung of phytivorous animals, kneaded with straw into clods, and dried in the sun.[2] From this source all the European states were formerly supplied; but since the manufacture of it in Europe, the importation of Egyptian sal ammoniac has been discontinued. Two processes are employed in this country.[3]

1. Bones, chopped into small pieces and boiled, in order to extract the marrow and fat, are distilled from a cast iron cylindrical still into a leaden receiver, cooled by a refrigeratory, which is its cover, and contains about four inches in depth of water. The retorts are sometimes vertical, and constructed of Welsh bricks, from ten to twenty in height. The top of the retort is an iron plate which is screwed down; and at the bottom there is a double trap door. The bones are introduced at the top, and the gases conveyed through a cistern of water into a series of receivers. An impure ammoniacal liquor and a fœtid oil are thus procured, whilst the residue in the retort is animal charcoal. The oil is skimmed off, and the alkali, which is termed *bone spirit*, mixed with pulverized gypsum. By double decomposition sulphate of ammonia and carbonate of lime are formed; the liquor which contains the former is then mixed with common salt (*chloride of sodium*);

[1] The eruption of Etna, in 1811, afforded as much sal ammoniac as supplied all the manufactories and apothecaries' shops in Sicily.—*Annales de Mines*, tom. v. p. 135. It is exhaled, also, from the Solfatara of Pozzuola; from one of the great apertures of which it has been extracted for several years.

[2] Dr. Royle informs us that in India the salt is found crystallised at the unburnt end of the brick kilns, in which the manure of animals is used as fuel: hence he concludes that it must have been early known to the Hindoos.—*Antiq. of Hind. Med.* p. 41.

[3] *Aikin's Dictionary of Chemistry*, art. *Sal ammoniac.*

and thus, by a second decomposition, hydrochlorate of ammonia and sulphate of soda are formed in the liquor. This solution is clarified by subsidence and decantation; and by a skilfully managed evaporation in leaden boilers, the two salts are separated as they crystallize. The water is then driven off from the hydrochlorate of ammonia, by exposing it to heat in a kind of oven; and the spongy, friable, ash-coloured mass, into which it is changed, being put, while hot, into globular bottles, or glazed earthen jars furnished with a moveable perforated cover, the hydrochlorate is sublimed by exposing them to a heat of 320° in iron pots filled with sand. The cakes of salt produced, after being placed "for a day or two in a damp atmosphere," to soften their surface, and facilitate the removal of any superficial impurities," are packed in casks for sale.

2. In the manufacture of coal gas, tar and an ammoniacal liquor are formed, called *gas liquor*, which contains *sulphate, hydrosulphate, hydrocyanate*, and *carbonate* of ammonia. To this liquor sulphuric acid is added, which converts nearly the whole of these salts into sulphate of ammonia, which is crystallized by evaporation, and then decomposed by admixture with chloride of sodium, and the mixed salt sublimed in iron pots into leaden dome-shaped heads, furnished at the top with an open tube, which is closed a short time after the process has been proceeding.

In some works[1] chloride of calcium is used instead of chloride of sodium. Carbonate of lime and hydrochlorate of ammonia are formed; the carbonate is then separated by a species of filtration in a perforated tub, and the solution evaporated to crystallization. The salt is next submitted to a degree of heat sufficient to dry it and drive off the water of crystallization; and lastly it is sublimed in iron pots, as already described.

The cakes of hydrochlorate of ammonia are hemispherical, about two inches to ten inches thick; elastic; and when broken, are towards the convex surface white, striated, and opaque; but towards the concave they have a more crystallized appearance, and are nearly semitransparent. When the cakes are removed from the leaden domes, the convex surface is of a dirty brownish colour, owing, as Dr. Jackson has stated, to its containing "a double chloride of lead and of ammonium."[2] This coating is scraped off.

The greater part of the sal ammoniac in the London market is made in England; but an inferior sort is imported in chests from the East Indies.

Qualities.—This salt is inodorous; has a salt, somewhat bitterish, cool taste; very slightly attracts moisture from the air; and has a specific gravity of 1·450. It is ductile, and therefore not

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[1] Messrs. Bush and Co., Bow Common. [2] *Lond. Med. Gaz.* Aug. 1839.

very easily pulverized. It requires 3·25 times its weight of water at 60°, and its own weight at 212°, to dissolve it; and during its solution a great reduction of temperature takes place. It is also soluble in $4\frac{1}{2}$ parts of alcohol. At a high temperature it sublimes without melting, and is unchanged. When dissolved in boiling water, it forms, as the solution cools, in tetrahedral or in flaky plumose crystals. Its components are 31·5 per cent. of ammonia, and 68·5 of acid; or 1 equiv. of acid + 1 ammonia. This salt may be represented either as a hydrochlorate of ammonia, or as a chloride of a hypothetical basyle supposed to be analogous to a metal, called ammonium (NH_4). Formula, NH_3, HCl or NH_4, Cl. It is an anhydrous salt. It combines unchanged with bichloride of mercury, and increases the solubility of that salt in water. The sulphuric and nitric acids unite with its alkali, and set free the hydrochloric acid. Potassa, lime, and magnesia set free the ammonia; the carbonates of baryta, lime, and of magnesia, combine also with its acid, and set free the ammonia in the form of a sesquicarbonate, which is rendered sensible by its odour. Acetate of lead, when added to a solution of it, throws down a precipitate of chloride of lead: it is decomposed also by nitrate of silver, the base of which forms a well-known insoluble compound with hydrochloric acid; hence these salts are incompatible in prescriptions with hydrochlorate of ammonia; but it may be combined in solution with the sulphate of copper, or of zinc.[1] The purity of the salt is determined by its complete sublimation when heated; by the solution giving no precipitate with chloride of barium; and no sulphuret of lead being thrown down when a stream of sulphuretted hydrogen gas is passed through its solution.

Medical properties and uses.—This salt was formerly considered a powerful aperient and attenuant of viscid humours, acting as a diaphoretic, diuretic, purgative, and emetic, according to the mode of exhibition, or the extent of the dose. Its action seems to resemble somewhat mercurial preparations, but it is now seldom ordered as an internal medicine in this country. On the Continent it has been employed in inflammation of various serous and mucous membranes, to remove the results of inflammation, and as an emmenagogue. In large doses it acts as an irritant poison, setting up inflammation in the mucous surface, followed by tetanic spasms and coma. Externally, it is advantageously employed, when mixed with its weight of nitre, and dissolved in eight parts of water, on account of the cold produced during its solution, to abate the pain and heat of inflammation and to allay violent headache. It is useful, also, in cases of mania, plethoric apoplexy, and injuries of the head, and to assist in the reduction of hernial tumours; but when it is

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[1] When precipitated with bichloride of platinum, the precipitate, which is yellow, yields, when dried, spongy platinum.

employed for this purpose, the solution should be made immediately before applying it to the affected part. It is also a useful application in dropsy of the thyroid gland.[1] Owing to its stimulant qualities, it forms an excellent discutient, when dissolved in the proportion of ℥ j. of the salt, in f ℥ ix. of water with f ℥ j. of alcohol, in indolent tumours, gangrene, scabies, and chilblains: in which cases it is better not to be too recently dissolved; and as a gargle, it is occasionally useful in cynanche. A plaster formed with ʒ ss. of the salt in powder, ʒ j. of soap, and ʒ ij. of lead plaster, is highly recommended by Dr. Paris[2] as a rubefacient in pulmonary affections. The efficacy of this plaster depends on the extrication of ammonia by the decomposition of the hydrochlorate, on which account it should be renewed every twenty-four hours.

If internally administered, the dose is from gr. v. to ʒ ss. in any mucilaginous solution.

AMMONIÆ LIQUOR FORTIOR, *Lond.* Stronger Solution of Ammonia. See Part III. *Aqua et Liquor Ammoniæ.*

This solution of ammonia is usually prepared in a large way by the manufacturing chemists; the greater part of that brought into the London market is made by Messrs. Howard and Kent. The materials, namely, hydrochlorate of ammonia and lime, are introduced into cast-iron pots, fitted with copper heads, which communicate with glass receivers containing water equal to the weight of the hydrochlorate employed. The gaseous ammonia which results from the decomposition of the hydrochlorate is absorbed by the water, whilst chloride of calcium and lime remain in the iron pot.

Qualities.—This solution of ammonia is colourless, most powerfully pungent, and possessing in an eminent degree all the properties of pure ammonia. At the sp. gr. 0·882 it contains about 30 per cent. of real ammonia, and 70 of water: f ℥ j. of the solution with f ℥ ij. of water is equal in strength to liq. ammoniæ of sp. gr. 0·960. It is strongly alkaline; boils at 130° Fahr., and forms a gelatinous mass when it is cooled down to 40° below zero. It should mix without becoming turbid with lime water; nor should a precipitate be thrown down by the solution of nitrate of silver.

Medical properties and uses.—This strong solution is never employed except to raise an immediate blister, which it effects in a few seconds, if a piece of calico or of bibulous paper moistened with it be applied to the skin. It is chiefly employed by the retail druggists for preparing the *Liquor Ammoniæ;* for which purpose they mix one fluid ounce of it with two fluid ounces of distilled water. See Part III.

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[1] *Burns on the Anat. of the Neck,* p. 191.

[2] *Pharmacologia.*

AMMONIÆ LIQUOR, *Lond.* Solution of Ammonia. Sp. gr. 0·960. See Preparations, Part III.

AMMONIÆ SESQUICARBONAS, *Lond. Dub.* See Preparations, Part III. *Ammoniæ Carbonas.*

AMMONIÆ OXALAS, *Lond.* Oxalate of Ammonia. Contained in the list of Tests. See Preparations.

AMMONI'ACUM. See *Dorema Ammoniacum.*

AMY'GDALUS. *Species Plant. Willd.* ii. 982.

Cl. 12. *Ord.* 1. A. Icosandria Monogynia. *Nat. Ord.* Rosaceæ. *Sub. Ord.* Amygdaleæ.

G. 981. *Cal.* 5-cleft, inferior *Pet.* 5. *Drupe* with a nut perforated.

1. A. *Persica.* The Peach-tree.

2. A. *communis.*[1] The common Almond-tree. *Med. Bot. 3d edit. t.* 183. *Hayne*, iv. 39. *De Candolle, Prod.* ii. 530.

Varieties. *β.* Amygdalus *dulcis.* Sweet Almond-tree.

——— *γ.* Amygdalus *amarus.* Bitter Almond-tree.

1. AMYGDALUS PERSICA.

AMYGDALUS PERSICA. *Folia.* Leaves of the Peach-tree. Not now officinal in British Pharmacopœias.

The peach-tree is a native of Persia; at least there is reason to think so from the name. It resembles the almond-tree in its general physiognomy. It is a small tree, with spreading branches; the flowers appear before the leaves; they are sessile, of a delicate rose-colour. The leaves are alternate, lanceolate, narrow, pointed, serrated; dark green above, and of a glaucous or pale green on the under disk. The fruit is round, having a deep furrow on one side, with a delicate, downy cuticle when ripe.

In America the peach is very abundant, requiring little or no culture. It was cultivated in England prior to 1557.

Qualities.—The leaves of the peach-tree, when bruised, exhale an agreeable odour; and as they yield hydrocyanic acid in considerable abundance, they are dangerous when eaten.

Medical properties and uses.—The same as those of the bitter almond, and of the leaves of the Cerasus *Lauro-Cerasus,* to which we refer our readers.

2. AMYGDALUS COMMUNIS.

Officinal. AMYGDALA JORDANICA; AMYGDALÆ OLEUM, *Lond.* AMYGDALA AMARA—DULCIS, *Edin.* AMYGDALUS DULCIS, *Dub.* The bitter and sweet Almond. Oil of the Almond.

Syn. Amandes douces et ameres (*F.*), Bittere und süsse mandeln (*G.*), Zoet amandel (*Dutch*), Mandel (*Dan. Swed.*), Migdalowe (*Polish*), Mandorli dolce ed amare (*I.*), Almendras dulces amargas (*S.*), Amendos doces amargosas (*Port.*), Sladkoi mindal—Gorkoi mindal (*Russ.*), Bādāmie Parsie (*Hind. Pers.*), Lowz (*A.*), Parise Vadamcottag (*Tam.*), Lonzan (*Malay*).

The almond-tree is a native of Syria and Barbary; but it is

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[1] Πάδος Theophrasti.

now naturalized in the South of Europe, and even in England[1]; where, however, the fruit seldom ripens. The flowers display themselves in March and April, before the leaves are expanded. It rises to the height of twenty feet, and divides into many spreading branches, which are covered with a dark grey bark. The leaves stand upon short glandular foot-stalks, are about three inches long, and three fourths of an inch broad, lanceolate, pointed at both ends, minutely serrated, with the lower serratures glandular, and of a bright green colour. The flowers, which appear before the leaves, are supported on very short peduncles. They are of a pale rose or blush colour, varying to white; the calyx is tubular, five cleft, segments blunt; the petals are five, ovate, convex, rose red; the filaments about thirty, inserted into the calyx, tapering, spreading, of unequal lengths, and furnished with orange-coloured, simple anthers; the germen is downy, with a simple style, supporting a round stigma. The fruit is a drupe, with a tough coriaceous covering, instead of the rich pulp of the peach: it opens spontaneously at the longitudinal furrow when ripe. The kernel or almond, which is enclosed in a tender, thick, brittle, spongy shell, is oblong, flattish, rounded at one end, and pointed at the other, and composed of two white cotyledons, enveloped with a thin, pale brown, veined, bitter skin, covered with an acrid meal.

The two varieties of the amygdalus *communis* are not distinguished from each other but by the taste of the kernel of their fruit. Nees von Esenbeck informs us that in the Palatinate bitter and sweet almonds are sometimes found on the same tree.

There are several varieties of *sweet almonds.* The *Valentia* almond is a sweet, large, flat almond, round at one extremity, pointed at the other, and compressed in the middle, as if with the thumb. The *Italian* almond resembles the Valentia, but it is not so sweet, is smaller, and less depressed in the middle. The *Jordan* almond, which comes from Malaga, and is the best sweet almond brought to England, is said to be the produce of a distinct species of amygdalus. They are longer, flatter, less pointed at one end, and less round at the other, and have a paler cuticle than those which we have described.

Sweet almonds in the shell, both hard and soft, are imported in baskets from Spain, and also in mats, casks, serons, and cases. The bitter almonds, which come chiefly from Mogadore, arrive in boxes. They are smaller than the sweet almond, and much thicker; they taste bitter, and when rubbed in water give out the odour of peach-blossoms.

When the almond is not well preserved, it is preyed on by an insect that eats out the internal part; or, if this does not happen, the oil it contains is apt to become rancid.

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[1] It was cultivated in England by Lobel before 1570.

Qualities.—The cuticle of both kinds of almonds has an unpleasant, bitterish, austere taste; but it is easily detached by putting the almonds into boiling water. When thus decorticated, they are said to be blanched; and display the cotyledons with the embryo at the pointed end.

The blanched *sweet almond* is inodorous; has a sweet, pleasant, bland taste; and consists of about 54 parts of *fixed oil,* 24 of *emulsin,* 3 of *gum,* 6 of *uncrystallizable saccharine matter,* a trace of *acetic acid,* and 4 parts of *woody fibre* and *water,* with 5 of *testa* =100·00. When eaten as food it is not very digestible, unless it be well masticated. The *bitter almond* is also inodorous when entire, but when triturated with water it has the odour of the peach-blossom; and the taste is the pleasant bitter of the peach kernel. It contains only 28 parts of *fixed oil,* but the oil is as bland as that of the sweet almond, and keeps better; 30 parts of *emulsin,* and, besides the other components of the sweet almond, a principle which has been named *Amygdalin;* which, when in contact with water and the emulsin, forms a volatile oil and hydrocyanic acid. The volatile oil of bitter almonds, which contains hydrocyanic acid, is prepared from the cake remaining after the expression of the fixed oil, by submitting it to distillation with water. One hundred weight of the cake generally yields from two ounces to two and a half ounces of the volatile oil. From the experiments of Mr. Hennel it appears that the hydrocyanic acid may be separated from this oil by digesting it with red oxide of mercury, which is converted into a cyanide. When this is done the oil still retains its odour of the peach-blossom, a proof that this odour does not depend on the hydrocyanic acid. Neither the volatile oil nor the hydrocyanic acid pre-exist in the bitter almond; both are developed by the action of water. From the experiments of Liebig and Wöhler, oil of bitter almonds appears to be a compound of the hydruret of benzule and hydrocyanic acid.

It has been already stated the *emulsin* and *amygdalin* are the sources of these productions. The former is a white substance, soluble in cold water, not precipitated from its aqueous solution by the salts of lead, nor by acids. It coagulates like albumen at 140°, and resembles this substance in composition. The latter is a white, inodorous, slightly bitter, crystallizable substance, soluble in boiling water and alcohol, insoluble in ether; it crystallizes in pearly, anhydrous scales out of alcohol; in transparent prisms, containing 6 atoms of water of crystallization, out of water. Its formula is $C_{40} H_{27} NO_{22}$.

By the action of the hydrates of the alkalies, amygdalin is decomposed into amygdalic acid ($C_{40} H_{26} O_{24} + HO$), and ammonia is disengaged.

M. Zinin found that when oil of bitter almonds is treated by a recent alcoholic solution of pure potassa, the whole becomes

rapidly transformed into a mass of crystals, having the same composition, and being an isomeric modification, of the oil, and named Benzoine.

When the ordinary volatile oil of bitter almonds is distilled after strong agitation with a solution of pure potassa and protochloride of iron, the oil is obtained distinct from the hydrocyanic acid; and by a second distillation with pure, dry lime, it is freed from water. It is then a colourless, volatile, inflammable fluid, retaining the odour of the peach-blossom, and having a burning aromatic taste; sparingly soluble in water; very soluble in alcohol, and containing no trace of hydrocyanic acid. What remains in the retort, after the first distillation, is Prussian blue. The common oil contains about 4 or 5 per cent. of hydrocyanic acid.

When the bitter almond is deprived of amygdalin it yields no volatile oil: when amygdalin is added to the emulsion of sweet almonds, the odour of the peach-blossom is developed: hence, as bitter almonds contain both *emulsin* and *amygdalin*, their mutual reaction, aided by water, is the source both of the hydruret of benzule and the hydrocyanic acid procured from the distillation of the marc of bitter almonds remaining after the abstraction of the fixed oil by pressure.

The volatile oil of bitter almonds, when pure, is nearly colourless, and has high refractive power; it has the odour of the peach-blossom and a hot bitterish taste; it is heavier than water; very soluble in alcohol and ether, and in about 30 parts of water. When exposed to the air, it absorbs oxygen, and benzoic acid is formed. It is a hydruret of benzule. Formula, $C_{14}\,H_5\,O_2 + H$.

A formula, representing approximately the decomposition of amygdalin under the influence of emulsin, has been given by Liebig and Wöhler.

1 eq. of amygdalin $C_{40}\,H_{27}\,N\,O_{22}$ =	1 eq. of hydrocyanic acid	C	H	N	
	2 eqs. of pure oil of bitter almonds - -	C_{28}	H_{12}		O_4
	Sugar - - -	C_6	H_5		O_5
	2 eqs. of formic acid -	C_4	H_2		O_6
	7 eqs. of water - -		H_7		O_7
		C_{40}	H_{27}	N	O_{22}

The *fixed* or *expressed* oil, Oleum amygdalæ, which both varieties of the almond yield by expression in large quantity, is insipid and inodorous, when heat has not been employed. The sweet almonds are seldom or never pressed for the fixed oil. Sixteen ounces of almonds yield about five ounces of a bland, inodorous oil, of a very slightly sweetish taste, which is at first a little turbid, but soon becomes clear. Its colour is a very pale greenish yellow, but it can

be rendered colourless by animal charcoal; and its specific gravity ·920. The oil from the bitter almond, it is said, keeps longer without growing rancid than that from the sweet almond. It is soluble in ether, in the proportion of f ʒ x. to ℥ iv. of ether: cold alcohol takes up one twenty-fourth of its weight; boiling alcohol one sixth.

Medical properties and uses. — *Sweet almonds* are used more as food than as medicine; but they afford little nourishment. Heartburn is said to be relieved by eating six or eight of them decorticated. When triturated with water, milky mixtures or emulsions are formed, which have a close affinity in their chemical characters to milk. Almonds are also used in pharmacy for assisting, by trituration, the combination of some substances, such as camphor, and the resins, with water. *Bitter almonds* are seldom used alone medicinally, although Bergius mentions a case of intermittent having been cured by them, when the Peruvian bark had failed. Reflecting on the effects which have been found to result from the use of the hydrocyanic acid, I have employed the emulsion of the bitter almond in pulmonary and dyspeptic affections, hooping cough, and asthmatic complaints, with the best success. As a topical application, I have found it extremely beneficial when used as a lotion in acné rosacea, and in impetigo. Owing to a peculiar idiosyncracy of some habits, the smallest quantity of the bitter almond taken into the stomach produces urticaria, and other unpleasant effects.[1]

This variety of the almond is said to operate as a poison on dogs, cats, foxes, and some other animals, but not generally, except in large quantity, on the human species.[2] The distilled water, however, of the bitter almond exerts an action not less deleterious than that of laurel water on the human frame: when taken to the extent of thirty drops, it produces vertigo, headache, or rather a sense of weight at the summit of the head, tinnitus aurium, dizziness of sight, and vomiting: half a fluid ounce of it has killed a stout dog.[3] When a large dose is taken, a paralytic state of the extremities supervenes, the pupil remains unalterably dilated, and the excitability of every organ of sense is diminished; indeed death almost instantly follows. In order to counteract its poisonous effects, when that can be done, we must have recourse to chlorine,

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[1] Dr. Gregory, the distinguished author of the Conspectus Medicinæ Theoreticæ, was thus affected by bitter almonds. Many accidents have occurred from confectionary made with them.

[2] For instances of their poisonous influence on man, see Wepfer, *Cicutæ Aquaticæ Historiæ;* Coullon, *Recherches sur l'Acide Hydrocyanique;* and *Lond. Med. and Phys. Journ.* vol. lvii. p. 150.

[3] Buchner, *Toxikolog.* Much information on this subject may be obtained from the works of Fodère, Langrish, Orfila, Heberden, Watson, and a Treatise on Hydrocyanic Acid by Dr. Granville.

both in solution taken into the stomach, and also in the gaseous state inhaled. This should be followed by diffusible stimulants, such as brandy and ammonia; or three or four spoonfuls of oil of turpentine may be given at intervals of half an hour. The volatile oil of bitter almonds operates as a sedative; but although its sedative effects depend on the hydrocyanic acid which it contains, yet it differs in its action from that acid, probably owing to the stimulant property of the volatile oil with which the acid is combined in it. It has been given in the same cases as hydrocyanic acid; but as the dose cannot be so well regulated, it is a more dangerous remedy than that acid. It appears from recent experiments that the pure *hydruret of Benzule* acts in a manner not unlike the other volatile oils, or simply as a stimulant, and has no sedative influence on the economy.

The *fixed oil* is demulcent and emollient, and is used in coughs and other pulmonary complaints, united with water by means of mucilage or yolk of egg and sugar. It acts, in large doses, as a gentle purgative. Dose ʒiv to ℥j.

Officinal preparations. — *Mistura Amygdalæ*, L. D. *Mistura Amygdalarum*, E. *Mistura Acaciæ*, E. *Confectio Amygdalæ*, L.

A'MYLUM. Vide *Triticum hybernum.*

AMYRIS. *Spec. Plant. Willd.* ii. 333.

Cl. 8. *Ord.* 1. Octandria Monogynia. *Nat. Ord.* Amyridaceæ, *Juss.*
G. 755. *Cal.* four-toothed. *Pet.* four oblong. *Stig.* four-cornered. *Berry* drupaceous.
Species 2. Amyris *Elemifera.* Elemi-tree.
Officinal. ELEMI, *Lond. Edin. Dub.*

Syn. Eleme (*F. G. I. S. Port. Dan. Dut. Swed.*), Goma de Limon (*S.*).

The tree yielding elemi, although stated in the London Pharmacopœia of 1836 to be that at the head of this article, yet is unknown. Dr. Pereira suggests that it may be the production of the Icica *Icicariba,* at least that which comes from Brazil; or of the Canarium *Zephyrinum,* or C. *balsamiferum;* but the question is still undecided, and in all the British Pharmacopœias it is now said to be the produce of one or more unascertained plants.

Elemi used to be brought from the Levant in long roundish cakes, wrapped in flag leaves; but it now comes in mats, chests, and cases.

Qualities. — True elemi has a fragrant aromatic odour, not unlike that of fennel seeds, but stronger. The taste is very slightly bitter, and warm. The cakes are of a pale yellow colour, semitransparent, brittle on the outside, soft and tenacious within, and very fusible. Spec. grav. 1·0182. When distilled with water, it affords $\frac{1}{16}$th of a thin pale-coloured volatile oil, on which its fragrance and softness depend; and the residue is a brittle, inodorous resin. Alcohol dissolves the greater part of elemi; but a white, flaxy, inodorous matter remains, which is almost entirely

soluble in water; hence we might consider the constituents of elemi to be gum, and an intimate combination of resin and volatile oil. Bonastre found it to consist of 84 per cent. of resin + 12·15 of volatile oil, and some bitter extractive. But little true elemi is now to be found in the shops.

Medical properties and uses.—This resin is stimulant, but is very rarely used as an internal remedy, being chiefly employed for forming the mild digestive ointment which bears its name.

Officinal preparations.—*Unguentum Elemi*, L. D.

ANACYCLUS. *Spec. Plant. Willd.* vii. 2171.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. Ord.* Asteraceæ.

G. 1516. *Receptacle* chaffy. *Pappus* emarginate. *Seed* with a lateral membranous margin.

Species. A. *Pyrethrum*[1] (Anthemis *Pyrethrum*, Linn.), *De Candolle. Fl. Fr. Suppl.* 480.—*Prodr.* vi. 15. *Desfont. Fl. Al.* ii. 287. *Pauli Dan.* t. 113. *Hayne*, ix. 46.

Officinal. PYRETHRUM, *Lond. Edin.* Pellitory of Spain. The root of *Anacyclus* (*Anthemis*) *Pyrethrum.*

Syn. Pyrèthre (*F.*), Bertramwurzel (*G.*), Tand wortel (*Dut.*), Piretro (*I.*), Pelitre (*S.*), Pyretro (*Port.*), Bertramsrot (*Swed.*), Spytteurt (*Dan.*), Zebne Ziele (*Pol.*), Akkurkurba (*Arab.*), Akākrākarum (*Tam.*), Akkarassutta (*Cing.*).

This plant was described by Linnæus under the name *Anthemis Pyrethrum;* but, on account of the structure of its seeds, De Candolle has placed it in the genus *Anacyclus.* It is a perennial, a native of the Levant, Barbary, Italy, France, and Germany.[2] The root is fleshy, fusiform; and, when recent, causing the sensation of cold on handling it.[3] It is externally brownish, internally whitish. The stems are many from the same root, procumbent, branching, downy. The lower or root leaves are stalked, pinnatifid, with pinnated segments and linear subulate lobes; the stem leaves are sessile. The ray florets are white above, purplish beneath; those of the disc yellow; somewhat resembling chamomile flowers.

Pellitory root is brought from the Levant in bales.[4] It is often mixed with other roots.

Qualities.—The dried root is in short pieces, about the length and thickness of the little finger. It is inodorous; and when chewed it is at first insipid, but after a few seconds it excites a glowing heat and a pricking sensation on the tongue and lips, which remains for ten or twelve minutes. The pieces break with a short resinous fracture; presenting a thick brownish cortex, studded with dark shining points, and a pale yellow, radiated,

[1] Πύρεθρον Dioscoridis.

[2] It was cultivated in England by Lobel in 1570; and is still seen in gardens, flowering in June and July.

[3] Desfontaine.

[4] Dr. Pereira informs us that none has been imported since 1836.

medullary structure. According to the analysis of Gautier[1], the active principle, which is deposited in vesicles in the bark, is an acrid fixed oil, of a reddish colour and strong odour, readily extracted by alcohol and ether. Parisel[2] describes it as an acrid resinoid, which he names *Perethrin*, insoluble in water, soluble in alcohol, ether, acetic acid, and the fixed and volatile oils. Koene[3] asserts that it is a mixed compound of acrid resin, acrid fixed oil, and acrid volatile oil. Hagen and Schönwald refer it to a scentless volatile oil, that adheres pertinaciously to the resin and fixed oil. Parisel found also *inulin, gum, tannic acid, colouring matter, chloride of potassium, silica,* and a trace of *iron* in pellitory root.

Medicinal properties and uses.—Pellitory root is a powerful topical excitant. Its chief use is as a sialagogue to stimulate the salivary glands, and excite an increased flow of saliva; by which inflammations and congestion of the neighbouring parts are relieved. It has been found useful, also, as a masticatory in cephalalgia, neuralgic and rheumatic pains of the face, toothache, paralysis of the tongue and organs of deglutition, in chronic ophthalmia, and in apoplexy.

Dose.—From ʒ ss. to ʒ j. of the root may be chewed at one time. A strong compound of one part of tincture of the bruised root, and five parts of rectified spirit, is used by the dentists to allay toothache.

ANAMIRTA. See *Cocculus Indicus.*

ANETHI OLEUM, *Lond.* Oil of Dill. See Preparations, Part III.

ANE′THUM.[4] *Spec. Plant. Willd.* i. 1469.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

G. 560. *Fruit* nearly ovate, compressed, striated. *Pet.* involuted, entire.

Species 1. A. *graveolens.* Common Dill. *Med. Bot. 2d edit.* 125. *t.* 48. *Hayne*, vii. 17.

Officinal. ANETHUM, *Lond. Edin.* Dill fruit. Fruit of *Anethum graveolens.*

Syn. Fenouil puant, ou persil odorant (*F.*), Aneto (*I.*), Eneldo (*S.*), Dill (*G.*), Dille (*Belg.*), Dil (*Dan.*), Dill (*Swed.*), Kopr (*Polish*), Endro (*Port.*), Sadācoopei (*Tam.*), Sowa (*Hind.*), Moongsi (*Jav.*), Buzralshibbet (*Arab.*).

This plant is an annual, a native of Spain and Portugal, Astracan, Egypt, and Timor, growing generally in corn fields, and flowering in June and July. It is cultivated in this country.[5] The root is fusiform and long, striking deep into the ground, and sending up several erect finely striated stems, about two feet in height, and branched. The leaves are glaucous and odorous, upon sheathing foot-stalks; those pinnated, with the pinnæ linear and

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[1] *Ann. de Chim. et Phys.* viii. 101.
[2] *Journ de Pharm.* xix. 251.
[3] *Ann. de Chim. et Phys.* lix. 327.
[4] Ἄνηθον Dioscoridis.
[5] It was first cultivated by Gerarde in 1597.

pointed. The flowers are in large, flat, terminal umbels, without either universal or partial involucrum; the corolla consists of five ovate, obtuse, concave, yellow petals, with the apexes inflected; the filaments are yellow, and longer than the corolla; with an inferior germen, covered by the nectary, and supporting two short styles, terminated by obtuse stigmas.

The fruit of dill, which is the part of the plant medicinally used, is about the length of a carraway, but broader and flatter. It is oval, concave on one side, convex and striated on the other; of a brown colour, and surrounded with a dull pale-yellow or straw-coloured membranous expansion. The vittæ are broad, one in the channel, and two on the commissure. When good, dill fruit is heavy, and of a bright colour; and it has an aromatic odour.

Qualities.—The dried fruit, or seed as it is usually called, has an aromatic, sweetish odour, not very agreeable, nor yet unpleasant; the taste is moderately warm and pungent. These qualities depend on a volatile oil, which is extracted by distillation with water (according to Mr. Brande, in the proportion of 2 lbs. to 1 cwt. of the fruit[1]). The colour and taste are imparted to alcohol by digestion. The bruised fruit yields its flavour to boiling water by infusion.

Medical properties and uses.—Dill fruit is carminative and stomachic. It is scarcely ever employed except in hiccough and the flatulent colic of infants. The dose of the powdered seed is from grs. x. to ʒj.

Officinal preparations.—*Aqua Anethi,* L. E. *Oleum Anethi,* E.

ANGELICA. *Spec. Plant. Willd.* i. 1428.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.

G. 343. *Fruit* roundish, angular, solid, with reflected styles. *Corollas* equal. *Petals* bent inward.

Species 1. Angelica *Archangelica.* Garden Angelica. *Med. Bot. 2d edit.* 86. *t.* 35. *Smith, Flor. Brit.* 1. 311. *Hayne,* vii. 8.

Officinal. ANGELICA, *Edin.* The root of *Angelica.*

Syn. Angelique (*F.*), Angelikawurzel (*G.*), Tamme Engelwortel (*Belg.*, Angelik; Ovanne (*Dan.*), Angelikerot (*Swed.*), Dziegel ogrodni (*Polish*), Djajilnik (*Russ.*), Angelica domestica (*I.*), Angelica (*S. Port.*).

This species of Angelica is a native of the more northern parts of Europe; but although it has been found growing wild in England, as at Broadmoor near Birmingham, and some other parts, yet it is uncertain whether it be indigenous. It is, however, abundantly cultivated for medicinal and other purposes; flowering in June and August.[2] The root, or rather rhizome, is biennial, thick, fleshy, and resinous, giving off many lateral fibres; the stem is erect, hollow, round, smooth, furrowed, of a purplish hue, rising

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[1] *Manual of Pharmacy.*

[2] It was first described by Joann. Jacob. *de Manliis,* a writer of the 15th century; and was cultivated in England before 1568.

upwards of five feet in height, and sending off many branches, which terminate in globular, many-rayed umbels, composed of dense, hemispherical umbellules. The leaves are numerous, petiolated, large, pinnated; with the leaflets ovate, pointed, cleft, and acutely serrated, smooth, somewhat decurrent, and the terminal ones three-lobed: the petioles are membranous at the base, nerved, greatly dilated, and bellying. The involucres are deciduous; the involucels short, consisting of five linear lanceolate leaves. The calyx is five-cleft, minute: the corolla small, of a greenish-white colour; petals five, with the points turned inward: the stamens spreading, longer than the petals; and the germen inferior, supporting two reflected styles with obtuse stigmas. The fruit is large, elliptical, flat on one side, convex on the other, emarginate at both ends, and acutely three-ribbed.

The roots of angelica, when wounded in the spring, yield an odorous yellow juice, which being slowly desiccated, proves an elegant gum-resin, very rich in the qualities of the plant. For medicinal purposes, the roots should be dug up in the autumn of the first year, as they are less liable to spoil than when they are taken up in the spring; for when gathered at that season, they become mouldy, and are preyed on by insects. They should be thoroughly dried, and kept in a well-aired, dry place; and in order to secure their preservation, Lewis suggests "the dipping them in boiling spirit, or exposing them to steam, after they are dried." The leaves and fruit do not retain their virtues when kept. The stems are cut, when tender, in May, and made into an agreeable sweetmeat by the confectioners.[1]

Qualities.—The odour of every part of the recent plant is fragrant and aromatic; the taste sweetish at first, then aromatic, warm, and slightly bitter. The dried root is corrugated, and of a greyish-brown colour externally; breaks short with a starchy fracture, and presents a firm interior, whitish, with many resinous brown and yellow points. It has the same odour and taste as the recent plant; and yields these qualities to alcohol, and in some degree to boiling water. Brande states that angelica root contains *volatile oil, a soft acrid resin, bitter extractive, gum, starch, oxidized extractive, albumen,* and *chloride of sodium.*

Medical properties and uses.—The leaves and fruit, or seeds, when recent, and the root both in the fresh and dried state, are tonic and carminative; but although the most elegant aromatic of northern growth, yet they are scarcely ever prescribed in modern practice. The dose in substance is from ʒss. to ʒj., which may be given three or four times a day.

ANISI OLEUM. See Preparations, Part III.

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[1] The Icelanders eat the stems and roots of angelica raw with butter.—Vide *Sir George Mackenzie's Travels in Iceland,* 4to. p. 255.

ANISUM. See *Pimpinella Anisum.*

ANTHEMIS. *Spec. Plant. Willd.* iii. 2174.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. Ord.* Asteraceæ.

G. 1517. *Receptacle* chaffy. *Seed down* none, or a membranaceous margin. *Calyx* hemispherical, nearly equal. *Florets* of the ray more than five.

* *With a colourless or white ray.*

Species 15. A. *nobilis.* Common Chamomile. *Med. Bot. 3d edit.* 47. *t.* 19. *Smith. Flor. Brit.* 904. *Hayne,* x. 47.

Officinal. ANTHEMIS, *Lond. Edin. Dub.* Chamomile Flowers. The flowers of *Anthemis nobilis.*

Syn. Camomille Romaine (*F.*), Roemische chamille (*G.*), Romische Kamille (*Dutch*), Romerske Kamilblomster (*Dan.*), Romerske Kamilblommer (*Swed.*), Camomilla Romana (*I.*), Manzanilla Romana (*S.*), Marcella Romana (*Port.*), Romashkai rimskaia (*Russ.*), Chāmaindoopoo (*Tam.*), Babbonehgaw (*Pers.*), Ehdaklmerzie (*Arab.*).

This species of Anthemis[1] is an indigenous perennial plant growing in dry pastures, and flowering from July to September. The greater part of the chamomile, however, which is medicinally used, is cultivated by the growers of medical plants.[2] The roots are woody, fibrous, and spreading: the stem is trailing, about a span in length, foliaceous and downy: the leaves verticillately bipinnate, the pinnæ distant, and the leaflets small, threadlike, sharp, generally cleft into three segments and pubescent; odorous, and of a pale green colour. The flowers are on solitary, terminal, unifloral, naked, striated, hairy peduncles. The calyx is common to all; the florets, hairy, with broad membranaceous edges; the disc is yellow and convex; the florets of the radius white, spreading, long, and somewhat elliptical, three-toothed, and turned down; and the seed obscurely crowned.

Both the single and the double flowered varieties are cultivated; but as the sensible qualities of the flower reside chiefly in the disc florets, the single kind should be preferred; and as these qualities are also stronger before the tubular florets are blown, the flowers ought to be then picked, and carefully dried for use. Those which are large are to be preferred; and the wild is to be preferred to the cultivated. It is readily distinguished from Matricaria *Chamomilla* and Pyrethrum *Parthenium,* with the flowers of which it is sometimes adulterated by the want of scales between the florets in these plants. The single flowers are sometimes called Scotch chamomile flowers.

Qualities.—The whole of the plant is odorous. The smell of the flowers is strong and fragrant; their taste bitter and aromatic, with

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[1] Ἄνθεμις Dioscoridis? Sibthorp says it is not A. *nobilis,* but A. *Chia,* which is the plant of Dioscorides. Ἀνθέμην Theophrasti.

[2] Much of what is brought to the London market is grown about Mitcham, in Surrey. The soil best adapted for it is a dry sandy loam. A wet summer weakens the flavour of the flowers. — *Stevenson's Survey of Surrey,* 379.

a slight degree of warmth; both the odour and the taste are extracted by water and alcohol. By distillation with water they yield a small quantity of a blue, or greenish blue volatile oil[1], which becomes yellow when kept, and on which the odour and much of the stimulant powers of the plant seem to depend. Hot water takes up nearly one-fourth of the weight of the dry flowers, and when the infusion is evaporated, a bitter extractive matter and a small portion of resin remain. The active principles, therefore, of chamomile flowers are supposed to be *bitter extractive*, *resin*, and *volatile oil:* but in treating them in the same manner as black pepper for procuring Piperina, I have obtained a notable quantity of that principle to which, chiefly, I ascribe the active antiperiodic properties of chamomile flowers.

Medical properties and uses. — Chamomile flowers are tonic, antiperiodic, antispasmodic, and slightly anodyne; yet when a strong infusion of them is taken in a tepid state, it proves powerfully emetic. When given in substance, finely powdered, and united with opium and astringents if the bowels be easily affected, they have been successfully used for the cure of intermittents[2]; and have been quaintly termed "the cinchona of the ancients."[3] Dioscorides recommended the powdered flowers to be administered to ward off the fever; and frictions with the oil were employed for the same purpose by Nechepsam, an Egyptian physician. The infusion in combination with ginger, or other aromatics, and the alkalies, is an excellent stomachic in dyspepsia, chlorosis, gout, flatulent colic, and chronic debility of the intestinal canal.[4] It is also useful in dysentery, when diarrhœa is not present. The tepid strong infusion is a ready emetic, and is often employed to promote the operation of other emetics. By coction in water the essential oil is dissipated; chamomile flowers, therefore, ought never to be ordered in decoctions. Externally they are used as fomentations in colic, intestinal inflammation, and to phagedenic ulcers; and the infusion is also found to be a useful addition to emollient anodyne glysters in flatulent colic, and in irritations of the rectum producing tenesmus. The dose of the powdered flowers is from gr. x. to ʒj. twice or thrice a day.

Officinal preparations.—*Infusum Anthemidis*, L. E. D. *Extractum Anthemidis*, E. *Oleum Anthemidis*, E. D.

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[1] The quantity obtained is about ℥ jss. from 1 cwt. of the flowers.—*Brande's Manual*. When the same water was used successively on lb. xij. of the flowers, Hayne procured ℥ x. ʒ v. 55 gr. of the oil from 108 lbs. of flowers.

[2] Morton's celebrated powder was composed of one scruple of chamomile flowers, ten grains of salts of wormwood, and ten grains of calx of antimony. It was given every sixth hour.

[3] *Traité Thérapeutique, par A. Trousseau.*

[4] Selle's celebrated Pulvis Ecphracticus consisted of equal parts of chamomile flowers, rhubarb, carbonate of potassa, magnesia, sulphur, and oleo-saccharum of fennel. — *Selli lib. de Cur. Stom. Morb.* vol. i. p. 131. (quoted in *Med. Rep.* vol. i.).

ANTHEMIDIS OLEUM, *Lond.* See Part III.

ANTIMONIUM. *Στιμμι.* *Stibium.* Antimony.

Syn. Antimoine (*F.*), Spiessglanzmetall (*G.*), Antimonio (*I.*), Antimonio (*S.*).

The term antimony was formerly given to an ore, in which antimony was combined with sulphur; but it is now solely appropriated to express the pure metal.[1] It is found in various parts of the world in different stages of combination.

A. Metallic (at Stalberg, Sweden, and Allemont in France).
g. i. combined with silver and iron. Sp. 1. *Native Antimony.*
ii. ——— with sulphur, - 1. *Grey sulphuret of antimony.*
Var. *a.* compact
b. foliated.
c. striated.
d. plumose.
2. *Nickeliferous sulphuret.*

B. Oxidized
iii. combined with oxide of iron - { 1. *White Antimony.* 2. *Antimonial Ochre.* 3. *Red Antimony.* }

The sulphuret or tersulphuret is the ore from which it is most abundantly procured. Pure antimony is of a white colour, with a bluish-grey shade, brilliant, and very slowly tarnished in air of a low temperature. The texture is lamellated, moderately hard, brittle, and pulverulent. It is fusible at 810° Fahr., and on cooling acquires a lamellated texture: in a very high temperature it volatilizes in close vessels; but if exposed to the air it is very rapidly oxidized, burning, and forming, when condensed on cool surfaces, white acicular crystals, argentine flowers of antimony, a teroxide of the metal. It decomposes water when ignited, and is oxidized by, and combines with, the sulphuric, nitric, and hydrochloric acids; but the other acids unite with its oxides only. It readily combines with sulphur and phosphorus. Its specific gravity, according to Brisson, is 6·702. The pure metal, when rubbed between the fingers, communicates to them a peculiar taste and smell, but it exerts no action on the body, nor is it used for officinal purposes. Antimony combines with chlorine, iodine, sulphur, and oxygen. The equivalent of antimony is 129·03.

Officinal.—ANTIMONII TERSULPHURETUM[2], *Lond.* ANTIMONII SULPHURETUM, *Edin. Dub.* Tersulphuret of Antimony. Sulphuret of Antimony.

Syn. L'Antimoine sulfure (*F.*), Schwefels piessglanz (*G.*), Spiesglas (*Belg.*), Spidsglands (*Dan.*), Rä Spetsglans (*Swed.*), Szpinlas (*Polish*), Antimonio crudo (*S.*), Solfuro d'Antimonio (*I.*), Antimonio (*Port.*), Doutrechsernistaia surma (*Russ.*), Kohul (*Arab.*), Surmah (*H. Pers. Duk.*), Sauvira (*San.*), Anjana kalloo (*Tam.*).

Tersulphuret of antimony is commonly sold in loaves, under the

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[1] Metallic antimony was first made known by Basil Valentine in the 15th century: the name is quaintly supposed to have originated from one of its preparations having proved fatal to some monks: hence *Anti-moine.*

[2] Antimonii Sesquisulphuretum, *L. Ph.* 1836.

name of *crude antimony;* and is the *grey ore,* separated from the stony matter and other gross impurities with which it is naturally combined. It is the *striated variety,* the most common of all the antimonial ores, found both in masses and crystallized in Hungary, Saxony, France, Tuscany, Spain, Cornwall in England, Dumfries-shire in Scotland, and Borneo[1]; generally "in micaceous schistus and clay porphyry, mixed with pyrites and oxides of iron. In its natural state, its colour is light lead-grey; its internal lustre splendent; its fracture radiated, affording splintery fragments. It is soft; not very brittle, but easily pulverised.

Tersulphuret of antimony is fitted for the market by the following process. The ore is separated from the greater part of the stony gangue by hand, and then placed in the bed of a reverberatory furnace, covered with charcoal powder. As it is brought to a low red heat, the sulphuret of antimony is fused, while the earthy parts float on the surface, and are taken off with a rake or ladle; and the fluid portion flows through an aperture, into vessels on the outside of the furnace. When cast into the form of loaves or large cakes, it is fit for sale, and forms the *crude antimony* of commerce.[2] Sometimes the ore is broken into small pieces, then washed and put into a pot perforated with holes, which is let into the mouth of another pot, so that the fluid sulphuret flows into the undermost, while the infusible matter remains in the uppermost. These loaves are dark steel grey externally, but internally they have a striated structure, and considerable brilliancy. Their goodness depends on their compactness and weight, the largeness and distinctness of the striæ, and the volatility of the sulphuret. When carelessly prepared, they contain sulphurets of lead, iron, copper, sometimes arsenic, and occasionally manganese. When they contain much sulphuret of lead, the structure is more foliated, and less distinctly striated, while at the same time the volatility is so much diminished that a portion, which is the sulphuret of lead, remains fixed. Lead is also detected by dissolving the tersulphuret in hydrochloric acid, throwing the solution into water, and lastly testing the supernatant fluid with hydrosulphuric acid: black sulphuret of lead is formed if that metal be present. Arsenic is discovered by the garlic odour emitted when the sulphuret is thrown on live coals; manganese and iron, by their not being volatilised when it is exposed to a red heat, and iron in particular, by the brown colour produced by deflagrating the sulphuret with nitre. The specific gravity of the tersulphuret is about 4·6; and

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[1] Sulphuret of antimony is found at Sarawak, in Borneo, immediately under the surface of the ground; and in such abundance that it is sold for 20 dollars a ton; and it is sent home to Europe as ballast.—*Earl's Travels in the Indian Seas,* Lond. 8vo. 1837, p. 311.

[2] *Journal des Mines. Aikin's Dictionary of Chemistry.*

its constituents are, antimony 72·8, sulphur 27·2 = 100 parts[1]; or, 1 eq. of antimony and 3 eqs. of sulphur. The greater part of the tersulphuret used in this country is imported from Germany and Holland. It should never be purchased in the form of powder.

Qualities.— Tersulphuret of antimony is inodorous, insipid, of a leaden grey or steel colour, stains the fingers, has a rough spicular fracture, and is insoluble in water and alcohol. Its brilliancy is dulled by long exposure to the air; in a red heat it melts, and is partly dissipated, along with its sulphur, partly as sulphurous acid, in the form of a white smoke; and what remains in the crucible is a grey ash-coloured oxide. It is slightly acted upon by the vegetable acids[2]; it decomposes the sulphuric and nitric acids when assisted with heat, and is dissolved and partially decomposed by the hydrochloric acid. With the two former acids the metallic part of the sulphuret is oxidized, sulphurous acid and nitrous gases are disengaged; with the hydrochloric, sulphuretted hydrogen is extricated, and terchloride of antimony remains in solution.[3]

Medical properties and uses. — Tersulphuret of antimony is not an active medicine when taken into the stomach, unless it meets with acid in that viscus or in the bowels, in which case it operates with extreme violence; before it is prescribed, therefore, the bowels should be opened. It was not employed internally until the middle of the fifteenth century; and now, owing to the uncertainty of its operation, its occasional violent action, and the difficulty of obtaining it perfectly free from other metallic compounds, especially those of copper, lead, and arsenic, it is seldom prescribed. It has been given in gouty and rheumatic affections, in scrofula and other glandular obstructions, and in chronic scabies, lepra, and other cutaneous eruptions.

It produces perspiration; and in a few instances in which it was given in large doses, Dr. Cullen found that some nausea and even vomiting were excited. It is freely used in veterinary practice, and is given to horses, mixed with their food, to produce a smooth coat. Its chief use is for the preparation of the other antimonial remedies.[4]

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[1] Dr. Thomson's proportions are, antimony 100, sulphur 35·572; nearly a mean of all the other analyses that have been published: Vauquelin stated them to be, antimony 100, sulphur 33·333; Wenzel, antimony 100, sulphur 29·870; Proust, antimony 100, sulphur 33·333; Dr. J. Davy, antimony 100, sulphur 34·960; Berzelius, antimony 100, sulphur 37·000; Bergman, antimony 100, sulphur 35·035.—*Thomson's Chemistry*, 5th edit. i. 536.

[2] Wine was formerly put into cups made of tersulphuret of antimony, and, owing to the acid of the wine acting upon the sulphuret, the wine acquired an emetic quality.

[3] The tersulphuret was used by the Greek ladies, and is still employed by the Turkish ladies, for staining the eyelashes black, which softens the appearance of the eye. It was a custom among the Jews also; for, although in our translation of the Bible, Jezebel is described as having "painted her face" (2 *Kings*, ix. 30.), yet the expression in the Hebrew means, literally, "put her eyes in painting."

[4] It is an ingredient in *Spilsbury's drops*, which, according to Dr. Paris, consist of

The dose of the sulphuret may be from ten grains to one drachm, or more, if the stomach can bear it.

All the preparations of antimony have one general mode of action, and possess, therefore, the same medicinal properties. Their general operation is evacuant, either by the stomach, the bowels, or the skin; but their determination to these particular parts depends more on the dose, and the constitution and state of the patient, than on the nature of the preparation. In small doses they produce nausea and diaphoresis; in medium doses, vomiting and purging; in large doses, vomiting at first; and a reduction of excitement.

Antimonials, prior to the time of Basil Valentine, were used only in veterinary medicine; but ever since they were introduced by that learned Benedictine[1] into the Materia Medica, they have been very generally employed for the cure of febrile and inflammatory diseases, when the excitement is great. In the latter stage of fever, however, when much debility prevails, their use is contra-indicated.

AQUA FONTANA, *Edin. Dub.* Spring water. An account of the different kinds of water, as spring, river, rain, and mineral waters, will be found in the APPENDIX. The Edinburgh College states that "for pharmaceutic use, spring water must be so far at least free of saline matter as not to possess the quality of hardness, or contain above a 6000th of solid matter."

AQUA DESTILLATA, *Lond.* See Preparations.

ARCTOSTAPHYLOS. *Spec. Plant. Willd.* ii. 616.

Cl. 10. *Ord* 1. Decandria Monogynia. *Nat. Ord.* Ericaceæ.

G. 871. *Cal.* five-parted. *Corolla* ovate, the mouth pellucid at the base. *Berry* five-celled.

Species 7. A. *Uva Ursi.* Trailing Arbutus, or Bearberry. *Med. Bot.* *3d edit.* 287. *t.* 100. *Smith's Flora Britan.* i. 403. *Sprengel, Syst. Veget.* *Hayne,* iv. 20. *Bigel. Med. Bot.* i. *t.* 6.

Officinal. UVA URSI, *Lond. Edin. Dub.* Uva Ursi. Leaves of Bearberry, or Trailing Arbutus.

Syn. Bousserolle; Raisin d'ours (*F.*), Baerentraube; Sandberren (*G.*), Beerendruif (*Dutch*), Mealbär-riis (*Dan.*), Mjölon (*Swed.*), Borowekowe (*Pol.*), Corbezzola; Uva d'Orso (*I.*), Madronna Uva de Orso; Gayaba (*S.*), Uva di Urso (*Port.*), Tolaknianka (*Russ.*), Kleh (*Chipewyan*), Attoonagaweeat (*Esquimaux*).

Corrosive Sublimate ʒij., *prepared Sulphuret of Antimony* ʒj., *Gentian root* and *Orange-peel,* of each, ʒij., *Shavings of red Saunders,* ʒj., made into a tincture, with *a pint of proof Spirit* digested and strained.

[1] BASIL VALENTINE was a Benedictine monk, at Erfurd, in Germany. He was born in the year 1394, and was the first person who applied chemistry, which prior to his time was considered merely as the art of making gold, to the purposes of medicine. He was the discoverer of the virtues of antimonial preparations as medicines; and has celebrated them in his "*Currus Triumphalis Antimonii,*" a work written in high Dutch, but of which there is an elegant Latin translation by Kirkringius. To Basil Valentine we are also indebted for the discovery of *Ammonia* and *Ether.* He recommended a *fixed alkali,* made from the shoots of the vine, cut in the beginning of March, for the cure of the gout and gravel. He was the chief of the medical alchemists.

This shrub is a native of the north of Europe, and is found growing wild on the heathy mountains and in the glens of Scotland, flowering in June. It is a low perennial shrub, with the branches nearly trailing; woody, and the bark smooth. The leaves are not unlike those of the myrtle, thick, evergreen, alternate, ovate, longish, with entire edges, on short petioles; with a network of veins on the under surface, which is pale green, whilst the upper is of a very deep-green colour, and glossy. The flowers are in small clusters, each supported on a red pedicel. The calyx is small and obtusely five-toothed: the corolla tubular, oval, flesh-coloured, or whitish, with a red lip, divided at the margin into five minute, obtuse, reflex segments; containing ten short, downy filaments, crowned with erect reddish anthers; and an oval germen, bearing a style longer than the anthers, with a simple stigma. The fruit is a small, succulent, round, smooth, glossy, deep-red, baccated capsule, with depressed umbilicus, five-celled, of an austere taste, and containing five angular seeds, in an insipid mealy substance.

The plant should be procured in autumn; and "the *green* leaves alone selected and picked from the twigs, and dried by a moderate exposure to heat."[1] The leaves are sometimes adulterated with those of the box, which contain no tannic acid; and those of Vaccinium *Vitis Idæa*, red whortleberry; which, however, are easily detected by their wanting the reticulated surface of the Uva Ursi leaves, by their edges being revolute, sparsely and finely serrated, and dotted beneath; and by their infusion not displaying the presence of tannic acid on either the addition of a solution of isinglass, or of sulphate of iron.

Qualities.—The fresh leaves are inodorous, and have a slightly bitter, astringent taste, leaving a sweet sensation in the mouth. When properly dried and powdered, they acquire an odour similar to that of Hyson tea; but the taste remains the same, the degree of bitterness only being increased. The colour of the powder is a light brown, with a shade of greenish yellow. Both water and alcohol extract its virtues, and the watery infusion strikes a deep black colour with sulphate of iron. When the powder of the leaves is rubbed with cold distilled water, little more than gallic acid is found in the solution. According to the analysis of Melandri and Moretti, the leaves yield *tannic acid*[2], *mucus, bitter extractive, gallic acid, some resin, lime*, and *oxygenizable extract*[3]*;* hence its infusion is incompatible with solutions of salts of iron, tartar emetic, nitrate of silver, salts of lead, decoction of yellow cinchona bark.

Medical properties and uses.—Uva Ursi possesses powerful

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[1] *Cases of Pulmonary Consumption, &c., by Robert Bourne, M.D.,* 8*vo. Lond.* 1806.

[2] Meigmer found 36·4 per cent. of tannic acid.

[3] *Bullétin de Pharmacie,* 1809, t. i. p. 59.

astringent properties[1], on which account it was employed by the ancients in several diseases; but it was not till after the middle of the last century that the attention of modern practitioners was directed to it, as a remedy for calculous complaints and ulcerations of the urinary organs, by De Haen. His observations were confirmed by Cullen: who, however, referred the good effects it produces to its action on the stomach. Dr. Stehberger found that it may be detected in the urine forty-five minutes after it is taken. It has been employed in menorrhagia, cystirrhœa, diabetes, and other fluxes; and Dr. Bourne has recommended it in tubercular phthisis. He combines it with cinchona and opium; but in both these combinations the powers of the substances are greatly diminished by the tannates which are formed; and the cases which he published are scarcely sufficiently decisive to confirm its use in this complaint. The dose of the powdered leaves is from ℈ss. to ℈ij., which may be taken two or three times a day.

Officinal preparations.—*Decoctum Uvæ Ursi,* L. D. *Extractum Uvæ Ursi,* L.

ARGENTUM, *Lond.* (APPENDIX), *Edin.*

ARGENTUM PURIFICATUM, *Dub.* Virgin, pure, or refined silver.

Syn. Argent (*F.*), Silber (*G.*), Zilber (*Dut.*), Silfwer (*Swed.*), Argento (*I.*), Pláta (*S.*), Prata (*Port.*), Solf (*Dan.*), Serebro (*Russ.*), Rupah (*H.*), Fazzeh (*A.*), Nokra (*Pers.*), Perak (*Malay*), Vellie (*Tam.*), Peddie (*Cing.*), Rajata (*Sans.*), Im-root (*Esquimaux*), N'zurfa (*Timbuctoo*).

Silver exists, native and mineralized, in different parts of the globe: in Great Britain, in combination chiefly with lead; in France, native silver is found in the departments of the Isère and Haut Rhin: in Germany, the most important mines are those of Freyburg, Schneeburg, and the Harz[2]: mines of silver also exist in Norway and in Spain. Silver has likewise been found at Barnaoule in western Siberia, but not in any very great abundance. The most abundant mines are those of Peru and Mexico. It is found,

a. pure crystallized.	Sp. 1. *Native silver.*
b. alloyed with gold.	2. *Auriferous silver ore.*
c. ——— with antimony.	3. *Antimonial silver.*
d. ——— with iron and arsenic.	4. *Arsenical silver.*
e. ——— with bismuth.	5. *Bismuthic silver.*
B. Sulphurets;	
f. combined with sulphur.	1. *Sulphuret of silver.*
g. combined with lead, antimony, and iron.	2. *White silver ore.*

[1] It is used in Russia for tanning leather.
[2] These yield annually 1530 marks of silver.

C. Oxidized;

h. combined with antimonial sulphuret of silver.	1. *Red silver ore.* Subsp. *a*, dark red; *b*, light red.

D. Salts;

i. combined with chlorine.	1. *Horn silver, common and earthy.*
k. ——— with carbonate of antimony.	2. *Carbonate of silver.*

Besides these ores, there are many metallic ores which contain silver in sufficient quantity to render the extraction of it profitable. In its native state, it is in small lumps, or crystallised in cubes, hexahedrons, octahedrons, or dodecahedrons; and occasionally it assumes the forms of leaves, threads, or twigs.[1] Its colour is white, its lustre metallic, and fracture hackly. Its specific gravity is from 10 to 10·338. It is not perfectly pure, but contains from ·03 to ·05 of gold, or arsenic, or antimony. Silver is obtained in its pure metallic state, generally, either by fusion or by amalgamation. By the first process, the native ore is roasted to expel the sulphuret, antimony, arsenic, or other volatile principles: the residuum is then fused with lead, and exposed in a cupel (a vessel made of bone or of wood ashes) to a strong heat in the hearth of a refining furnace; when the lead and the foreign metals, being thus oxidized, and the oxides fused, are in part absorbed by the porous cupel, and in part volatilized and driven off by the current of air from the bellows or the blast-pipe. An experienced eye knows when the silver is sufficiently pure; but in general it requires a second cupellation at a higher temperature to purify it completely from the lead with which it is combined. By the second process, the ore is first roasted, then ground to a fine powder, washed, mixed with sea salt, and roasted in a reverberatory furnace. The sulphur is changed into sulphuric acid, and sulphate of soda is formed, whilst the chlorine of the sea salt forms with the silver a chloride. The whole roasted mass is next ground to powder, mixed with mercury, iron, and water, and formed into an amalgam with the mercury, by the barrels being made to revolve very rapidly on their axis by means of machinery. The silver is first separated from the chlorine by the iron, and forms an amalgam with the mercury: it is then separated from the mercury by distillation. For pharmaceutical purposes, the best mode of procuring pure silver is the following, pointed out by M. Gay Lussac:—Dissolve the silver to be purified in diluted nitric acid, and dilute the solution farther with distilled water; then precipitate the silver by means of a clean plate of copper; wash the precipitate with a solution of nitrate of silver, digest in ammonia, and ultimately wash with boiling distilled

[1] It is found in this form in the famous mine of *Potosi*, and is called *dendrites:* also in the Ural.

water; the pure silver is then obtained in the state of powder. Or, instead of using the plate of copper, decompose the solution of the nitrate of silver with chloride of sodium, wash and dry the precipitate, and then throw the dry chloride in successive portions into a red-hot Hessian crucible containing twice the weight of the silver salt, of fused carbonate of potassa. Effervescence takes place, chloride of potassium is formed, carbonic acid and oxygen gas are evolved, and pure silver subsides to the bottom of the crucible.

Qualities.—Pure silver is a brilliant-white, insipid, inodorous, sonorous metal, with a very rich lustre, which it loses when long exposed to the air, owing to sulphuretted hydrogen being almost always present in the atmosphere. It is in hardness between iron and gold, of considerable malleability, the finest silver leaf being only one third thicker than gold leaf. It is of inferior ductility to gold, platinum, and iron. Its specific gravity, when hammered, is 10·5. Silver is fusible at 1873° Fahr. or 28° Wedgewood; it is volatilized by a stronger heat; but is difficult of oxidizement by the action of heat and air. It combines readily with *Chlorine, Iodine, Sulphur,* and *Cyanogen:* is oxidized by sulphuric and nitric acids, and combines with them; but none of the compounds, except that produced with nitric acid, are used in medicine. In the solution of the nitrate, chloride of sodium throws down a white precipitate, which is soluble in an excess of ammonia;—when the silver is pure, the addition of hydro-sulphuric acid does not colour the supernatant fluid when the chloride is precipitated. The equivalent of silver is 108. Silver is often alloyed with copper, which is detected by forming the nitrate into a chloride, and testing the supernatant fluid with hydrosulphuric acid: a black precipitate falls if a salt of copper be present. When lead is present, ammonia does not dissolve the whole of the chloride.

Medical properties and uses.—Metallic silver has no action on the human body; but, when combined with nitric acid, it forms a very powerful remedy. Many of the instruments used by the surgeon require to be made of silver. The metal is introduced into the APPENDIX of the London Pharmacopœia as a test, to discover the presence of nitric acid in any fluid, such as acetic acid.

Officinal preparation.—*Argenti Nitras,* E. D.

ARGENTI NITRAS, *Lond.* (*Crystals,* APPENDIX.) See Part III.

ARISTOLOCHIA.[1] *Spec. Plant. Willd.* iv. 151.
Cl. 20. *Ord.* 4. Gynandria Hexandria. *Nat. Ord.* Aristolochiaceæ.

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[1] The Ἀριστολοχια Dioscoridis gives name to the genus, but is not the officinal plant, which was introduced only since the settlement of Europeans in America. The name is derived from some supposed virtue of cleansing the lochia after child-bearing; hence the English name *Birthwort.*

G. 1609. *Cor.* of one petal, strap-shaped, ventricose at the base. *Cap.* six-celled, inferior, containing many seeds. *Stem,* twining, frutescent.

Species 27. A. *Serpentaria.* Virginia Snake-root, or Birthwort. *Med. Bot. 3d edit.* 152. *t.* 59. *Veg. Mat. Med. of the United States,* pl. 25. *Hayne,* ix. 21.

Officinal. SERPENTARIA, *Lond. Edin.* ARISTOLOCHIA SERPENTARIA, *Dub.* Serpentaria or Virginian Snake-root.

Syn. Serpentaire (*F.*), Virginianische Schlangenwurzel (*G.*), Slangelwortel (*Dutch*), Slangeurt (*Dan.*), Ormrot (*Swed.*), Serpentaria Virginiana (*I. S. Port.*), Zmeevik Virginskie (*Russ.*).

This plant is a native of North America, from Pennsylvania to Florida; flowering in May and June, and ripening its seeds in September. The root is perennial, consisting of bundles of fibres, of a yellow-ochre colour, which changes to brown on drying, attached to a contorted horizontal caudex; from which several stems rise about 10 inches in height, slender, zig-zag, and jointed; supporting on long foot-stalks at each knot, thin, cordate, entire, pointed, trinerved leaves, of a yellowish-green colour. The flowers proceed from the joints near the root, and stand upon long sheathed articulated peduncles, which bend down and almost bury the flowers beneath the decayed leaves near the roots.[1] There is no calyx: the corolla is of a brownish purple colour, globular at the base, contracted and bent in the middle, and terminating in a triangular lip. The anthers are sessile, attached to the underside of the stigma, which is roundish, divided into six parts, and almost sessile, rising from an oblong, angular, hairy, inferior germen. The seeds are flat, and contained in a six-celled hexagonal capsule.

Dried serpentaria root is imported into this country in bales, each containing from one to two hundred weight. It is frequently mixed with the roots of Aristolochia *hastata,* A. *tomentosa,* and of Collinsonia *præcox.*

Qualities.—The dried root is in the form of a root stock, to which is attached a tuft of long yellowish-brown rootlets: it has an aromatic odour, not unlike that of valerian; and a sharp, warm, bitter, pungent taste, resembling, in some degree, that of camphor. Water extracts all the sensible qualities of the root, affording a yellowish-brown infusion, which is not altered by sulphate of iron, nor zinc, nitrate of silver, bichloride of mercury, potassio-tartrate of antimony, the mineral acids, the alkalies, nor by gelatine nor tannic acid. The acetate of lead throws down a flocculent precipitate, which is not soluble in acetic acid, showing the presence of mucus. With alcohol, it affords a bright greenish tincture, which is rendered turbid by the addition of water. According to

[1] Some of the species of Aristolochia, in South America, have flowers large enough to serve as bonnets for children.

Bucholz, the components of serpentria are, *volatile oil*, 0·5; *yellow gum-resin*, 2·85; *extractive*, 1·70; *gummy extract*, 18·10; *woody fibre*, 62; and *water*, 1·40.[1] The chief active principles of serpentaria, therefore, appear to be a bitter resin and a volatile oil. To these, however, Chevalier adds, *starch, albumen, malate and phosphate of lime*, and *oxide of iron*.[2]

Medical properties and uses. — Serpentaria root is a stimulating diaphoretic and tonic. It is beneficially employed in typhoid and putrid fevers, whether idiopathic, or accompanying the exanthemata, to excite diaphoresis, and support the powers of the system: it is found frequently to increase the efficacy of cinchona and its salts in removing protracted intermittents. It is also an excellent remedy in dyspepsia, particularly when the skin is dry and parched; and it is sometimes used as a gargle in putrid sore throat. On account of its stimulant properties, it is contra-indicated in the inflammatory diathesis; and, previous to its exhibition, the bowels should be well evacuated.

It may be given in substance, or in infusion made by macerating ʒ iv. of the bruised root in f ℥ x. of boiling water, in a covered vessel for two hours, and straining. Decoction is a bad form of preparation of serpentaria, as the boiling dissipates the volatile oil, on which much of the virtue of the remedy depends. The dose of the powdered root is grs. x. increased to ʒ ss.; that of the infusion, f ℥ jss. to f ℥ ij., given every fourth hour.

In large doses serpentaria deranges the stomach, causing nausea, flatulence, and vertigo.

Officinal preparations. — *Infusum Serpentariæ*, L. E. *Tinctura Serpentariæ*, L. E.

ARMORACIÆ RADIX. Vide *Cochlearia Armoracia.*

ARNICA. *Spec. Plant. Willd.* iii. 2106.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. Ord.* Asteraceæ.

G. 1491. *Recep.* naked. *Seed-down* simple. *Cal.* with equal leaflets. *Corol.* of the ray have more frequently five filaments without anthers.

Species 1. A. *montana.* Mountain Arnica. *Med. Bot. 3d ed.* 41. *t.* 17. *Fl. Dan. t.* 728. *Nuttal. Gen. Aus.* ii. p. 164. *Hayne*, vi. 47.

Syn. Arnique (*F.*), Arnika, Woheverleih, Falkraut (*G.*), Valkruid (*Belg.*), Wolverley (*Dan.*), Wolfswortel (*Dut.*), Hāst fibler, St. Hansblomster (*Swed.*), Arnica (*I.*), Barannik gernoi (*Russ.*).

This species of Arnica is a native of the northern parts of the continents of Europe and America, and of Siberia; flowering in July. It is also found in Portugal and on the Pyrenees, and is cultivated in our gardens.[3] The root is perennial, brown, woody, præmorse, with bundles of long fibres attached to it; the stem, which rises about a foot in height, is obscurely angular, striated,

[1] *Gmelin, Hand. d. Chim.* [2] *Journ. de Pharm.* vi. 365.

[3] It was introduced by Mr. P. Miller in 1759.

rough, hairy, and terminated by two or three upright flower stalks, each bearing one flower. The radical leaves are obovate, entire, ciliated, and more obtuse than those of the stem, which are in opposite pairs, and lance-shaped. The flowers are of a deep copper-yellow colour, tinged with brown; the involucre is a dirty green, composed of fifteen or sixteen lanceolate, equal, hairy scales, with purple points; the ray florets are about fourteen, female and ligulate, twice as long as the involucre, striated, three-toothed, and hairy at the base; the disc consists of tubular florets, bisexual, with a five-lobed margin. The achene is oblong, striated, hairy, and crowned with a russet-coloured rigid pappus.

The herbaceous part of the dried herb, which is used equally with the flowers and roots, seems as if covered with a hoary powder.

Qualities. — The dried plant has a pleasant, weak, aromatic odour, and excites sneezing. The taste of the *leaves* and the *flowers* is slightly aromatic, bitter, and pungent; that of the root, bitter and acrid. The leaves and the flowers, macerated in boiling water, yield an olive-brown infusion, which has an odour not unlike that of senna, and a bitter, hot taste. It reddens tincture of litmus; but does not precipitate gelatin, nor alter solutions of tartarized antimony, nor of bichloride of mercury. With sulphate of iron and of zinc, it strikes a deep green colour, and gives dark precipitates; and with sulphate and ammoniated sulphate of copper, it forms a pea-green precipitate. Acetate of lead coagulates it. The mineral acids render it muddy, and of a dirty white colour, occasioning brown precipitates; but the alkalies only deepen its proper colour. Both alcohol and sulphuric ether take up, from the flowers and the leaves, a resinous matter, which can be separated from the alcohol by water, and from the ether by evaporation. Arnica contains a *volatile oil*[1], an *acid*[2], *resin*, a *nauseous bitter extractive* (which, according to MM. Lassaigne and Chevallier, is *cytisina*[3]), *tannic acid*, and *gum*.

Medical properties and uses. — The *leaves* and *flowers* of arnica are narcotic, stimulant, and diaphoretic; and in large doses, emetic and cathartic; the *root* is tonic and aromatic; but it is more apt to excite vomiting than the flowers. The *leaves* are also employed. The flowers have been used with advantage in paralytic affections, amaurosis, gout, rheumatism, and chlorosis. They have been extolled also in convulsive diseases, diarrhœa, and dysentery; but in the latter, their stimulant properties prove often hurtful. In paralysis, their good effects are generally preceded by a pricking sensation in the affected part; but in general they do not produce

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[1] The oil procured from the roots is yellow; that from the flowers is blue. Both are lighter than water, and have a hot, aromatic taste.

[2] Bouillon la Grange thinks it is the gallic acid.

[3] This principle derives its name from having been first found in the seeds of the Cytisus *Laburnum.*

any sensible operation, unless when exhibited in too large doses: in which case they produce great anxiety, pain, vomiting, tetanic twitchings, and the other deleterious effects of powerful narcotics. The *root* has been much extolled in Germany, as a substitute for cinchona bark in intermittents, putrid fevers, and gangrene: particularly by Dr. Collin of Pazman; but in the hands of British practitioners it has not deserved the high encomiums which he has bestowed on it in these cases. It is regarded by the French practitioners as an excellent excitant-tonic in paralysis.[1]

Externally the powdered leaves may be used as an errhine.[2]

Arnica may be exhibited in substance; or in an infusion, made by macerating ʒj. of the leaves and flowers, or ℈ij. of the bruised root, in f ℥x. of boiling water, and straining through linen. The infusion soon ferments. A dose of the powder is from grs. v. to grs. x.; that of the infusion, f ℥jss, twice or thrice a day.

ARSENICUM[3], Arsenic.

Syn. Arsenic (*F.*), Arsenick (*G.*), Arsénico (*S.*).

This metal is found in most parts of the world, accompanying other metals, and occasionally uncombined, forming distinct and peculiar veins. The following are the states in which arsenic is found: —

A. In its metallic state:	
i. Alloyed with iron, or silver, or gold.	*Sp.* 1. *Native arsenic.*
B. United with sulphur and iron:	
ii. Sulphurets.	2. *Arsenical pyrites.*
	3. *Orpiment.* Var. *a.* Realgar. *b.* Orpiment.
C. United with oxygen:	
iii. oxide.	4. *Native oxide.*
D. Acidified; and	
iv. Combined with lime.	5. *Arseniate of lime. Pharmacolite.*
v. Combined with copper.	6. ——— *copper.* Var. *a.* Foliated. *b.* Lenticular. *c.* Oliven ore.
vi. Combined with iron.	7. *Arseniate of iron. Cube ore.*
vii. ——— lead.	8. ——— *lead.*
viii. ——— cobalt.	9. ——— *cobalt. Red cobalt ore.* Var. *a.* Cobalt crust. *b.* ——— bloom.

[1] Vide *Nouv. Elémens de Thérapeutique*, par I. L. Alibert, 2d edit. vol. i. p. 141.

[2] The Savoyards, and the inhabitants of the Vosges, both snuff and smoke the leaves; and hence the plant is known on the Continent by the name of *Tabac des Savoyards et des Vosges.* With the exception of the goat, no animal will eat the plant.

[3] From ἀρσενικον Dioscoridis, which, however, is not the metal, but orpiment, one of the sulphurets; σανδαραχη of the other Greeks was realgar.

As metallic arsenic is not used in the arts, it is seldom extracted from its ores, but is prepared from white arsenic, or arsenious acid, which is commonly procured in roasting the *red cobalt ore*, arseniate of cobalt. It is necessary, however, to be acquainted with the appearances and properties of metallic arsenic; as the reduction of the acid is one mode of ascertaining whether the arsenious acid has been used as a poison in cases of suspicious death.

Its colour is bluish grey, something like that of steel, with much brilliancy. It is quickly tarnished by exposure to air, becomes black, and is covered with a powder. It is brittle, and pulverulent. Its specific gravity is 5·8843.[1] It volatilizes at a heat of 356° Fahr., in dense white fumes, which have the odour of garlic, although the solid metal is inodorous. In its metallic state, arsenic exerts no action on the animal system; but when oxidized it is a virulent poison. The equivalent of arsenic is 75·00.

Officinal preparation. — *Arsenicum purum,* Dub. *Pure metallic Arsenic.* See Part III.

ACIDUM ARSENIOSUM, *Lond.* ARSENICUM ALBUM, *Edin.* ARSENICI OXYDUM ALBUM VENALE, *Dub.* Arsenious Acid. White Arsenic. Teroxide of Arsenic. Commercial Arsenic.

Syn. Arsenic blanc: Acide arsenieux (*F.*), Arsenichste saure: Gift mehl (*G.*), Arsenik Hwitt rattgift (*Swed.*), Rottekrudt (*Dan. Polish*), Rottenkruid (*Dut.*), Mischjak: Mischiakovistaia kislota (*Russ.*), Arsenico bianco (*I.*), Arsenico blanco (*S.*), Arsenico Turabulhalik (*Arab.*), Samuel-k'har (*H*), Sanc'hya (*San.*), Vullay Pashanum (*Tam.*), Sumulfar (*Pers.*), Wrangon (*Malay*).

Arsenious acid is found native and uncombined at Andreasburg in the Hartz, and elsewhere: but the greater part of the white arsenic (arsenious acid) of commerce is obtained in Bohemia and Saxony, in roasting the arseniurets of cobalt for making zaffre; at Altenburg in Silesia it is procured from arsenical iron pyrites, *Mispickel;* and at Riechenstein from the sesquiarseniate of iron. A portion also is collected from roasting grey copper ores and white mundic in Cornwall. These ores contain sulphurets of copper, iron, arsenic, nickel, zinc, and tin. The roasting is performed in furnaces with long flues, in which the impure arsenious acid, in combination with sulphur is condensed, and this is purified by sublimation in the following method: — Large square boxes of cast iron, furnished with conical heads, which are closely luted to them with clay, and are terminated by an iron pipe, which passes into a condensing chamber. The pots are disposed in a brick area, heated by the flues of two furnaces, placed a little beneath them. When these boxes are red-hot, the impure arsenic, by fifteen pounds at a time, is put into them, where it melts and soon sublimes in the conical head. Successive additions are thus submitted to the action of heat, till about 150 pounds have been used to each vessel; and then the apparatus is allowed

[1] *Turner.*

to cool. The conical head is now separated from the box, and carried with its contents into another place, where the workmen break off with hammers the sublimed oxide, separating the impurities for a second operation.[1] The vapours from these works are destructive both to vegetables and animals in their neighbourhood.

The *arsenious acid* thus obtained is a dense, semi-transparent, or vitreous solid cake, breaking with a conchoidal fracture; and becoming opaque, of a snowy whiteness, and often pulverulent, when exposed to the air. It is met with in both these forms in the shops; and often is sold in powder, in which state it is sometimes adulterated with white sand, chalk, and gypsum; but the fraud is easily detected by heating a small portion of the suspected powder, by which the oxide is entirely dissipated, and the impurities are left behind.

Although the greatest quantity of the arsenious acid used in this country is brought from Germany, in casks, each containing from two to five hundred weight, yet much is prepared in Cornwall [2] from the arsenical ores of copper, in the roasting of which it is formed, and sublimes along with sulphur, in a pulverulent form, in chambers attached to the furnaces. This mixture is next put into a reverberatory furnace, having a long flue; and the heat is augmented in such a manner as to volatilize the sulphur before the arsenious acid, which requires a higher temperature than the sulphur for its volatilization. The heat is then raised to sublime the arsenious acid, which condenses in a different part of the flue from the sulphur. It is now collected and put into conical cast-iron retorts, in which it is sublimed. It is thus procured of a pale amber-colour; but it is not pure.

Qualities.—Arsenious acid is inodorous, and has no taste. When pure, if it have not been freely exposed to the action of the air, it is in semi-transparent, vitreous, colourless, shining masses, which break with a conchoidal fracture. They are partially opaque on the surface, and transparent. The opacity is supposed to depend on the absorption of moisture. Gouibourt has lately ascertained that 1000 parts of water at 90° dissolve, during 36 hours, 9·6 of the transparent or glassy acid (sp. gr. 3·7391), and 12·5 of the opaque (sp. gr. 3·695): that the same quantity of boiling water dissolves 97 of the glassy, retaining eighteen when cold; and 115 of the opaque, retaining 29 when cold.[3] Dr. Alfred Taylor finds no difference in the solubility of arsenious acid in these two conditions. According to Dr. Christison, tea, milk, and similar organic substances impair its solubility.[4] Both solutions usually

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[1] *Journal de Physique*, tom. i. p. 44.

[2] There are only three works in Cornwall; one at Bissoe-bridge, another at Perranwell near Truro, and the third near Redruth. From 600 to 800 tons are annually prepared in Cornwall.

[3] *Journ. de Chim. Méd.* t. ii. p. 57.

[4] *Christison on Poisons*, p. 77.

slightly redden infusion of litmus, and combine with the alkalies. Arsenious acid is soluble also in solution of pure potassa, and in hydrochloric acid. When heated in the open air, this acid is volatilized in a temperature of about 380° Fahr.: the vapour has no odour; but if it be heated in contact with any substance which has an affinity for oxygen sufficient to decompose it, then the vapours have an alliaceous odour.[1] The specific gravity of the acid in its ordinary state is 3·706, that of the glassy variety 3·699. 100 parts of the acid consist of 74·6 of arsenic, and 25·4 of oxygen; or of 1 equiv. of arsenic + 3 eqs. of oxygen. On the simple watery solution of the acid, no change is produced by a solution of sulphate of iron, of bichloride of mercury, tartar emetic, the mineral acids, or the alkalies; but ammoniacal nitrate of silver throws down a lemon yellow precipitate, which gradually passes to a brown colour; ammoniated sulphate of copper a pea-green precipitate; and acetate of lead a white precipitate. Lime water also precipitates the solution white; sulphurets of the alkalies, pale yellow; and sulphuretted hydrogen gas, and an aqueous solution of that gas, golden yellow.

Medical properties and uses.—Although arsenious acid is the most virulent of the mineral poisons, yet when properly administered, it is a medicine of great efficacy; and is employed internally as a tonic, and externally as an escharotic. It had been long used as an external empirical remedy in cancer, and internally in some cutaneous affections, both in Europe and the East Indies. It was first employed as a remedy for the cure of intermittents in Hungary, and has been long used in Lincolnshire under the name of "*the ague drop;*" but its effects were not clearly understood, nor the proper mode of administering it known, till Dr. Fowler of Stafford published his Observations on its use in the cure of intermittent fevers and periodical headaches.[2] Since that time the authority of many respectable practitioners has been brought forward in confirmation of its efficacy in these diseases. My own experience has amply confirmed its value in lepra, chronic rheumatism, intermittent hemicrania or *megrim,* and scirrhus. It is stated to have proved useful in some local painful affections "of the ends of the bones, cartilages, or ligaments, or of all three together." It has also been used in chorea, dropsy, hydrophobia, syphilis, visceral and glandular obstructions, and in many other diseases, in which, however, its efficacy is by no means established.[3] In the East

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[1] The smelters of copper in Cornwall and Wales, although much exposed to the vapours of arsenic, yet suffer very little from them; but they are sometimes attacked with cancer in the scrotum. Dr. Paris (*Pharmacologia*) remarks, that they rely upon oil being an antidote; and are consequently supplied with it by their employers.

[2] It is a curious fact, that, previous to the introduction of copper-works in Cornwall, agues were very frequent; but since that period the disease is extremely rare. "I have heard," says Dr. Paris (*Pharmacologia*), "remarked by the men in the works, that the smoke kills all fevers." Is this owing to the arsenical fumes?

[3] For a list of these diseases, see a paper by Mr. Hill of Chester.—*Edinburgh Med. Journal,* v. 19. 312. and vi. 55.

Indies the native physicians employ white arsenic (*sanc'hya*) made into pills with six parts of black pepper, for the cure of confirmed lues (*Persian fire*), and of a species of elephantiasis (*Judham*).[1] It is also used in cases of the bite of the hooded snake, *cobra del capello.*

The internal use of arsenious acid is contra-indicated in all cases attended with strong arterial action, and where there are any pulmonary symptoms; and should a cough even intervene during its use, it should be instantly discontinued. When it is exhibited in proper cases, and with necessary precaution, the effects it produces must be carefully observed: "the feeling of swelling and stiffness of the palpebræ and face, heat, soreness and itching of the tarsi, or tenderness of the mouth,"[2] loss of appetite, thirst, want of sleep, tremors, hot skin, and quick pulse, are indications that the dose of the remedy has been carried to its full extent, and should then be diminished. If erythema or salivation appear, the use of it must be suspended; and it should be altogether abandoned, if pain in the stomach, or nausea, vomiting, headache, or vertigo be induced.

This acid is exhibited either in substance or in solution. The best mode of giving it in substance is in pills, formed by rubbing one grain of the acid with a few grains of sulphur, and then beating the mixture with a sufficient quantity of crumb of bread, so as to form ten moderately sized pills; one of which is a dose. The solution, however, is more manageable. The most common form of it is that of the *Liquor Potassæ Arsenitis;* but the simple solution in distilled water, in the proportion of four grains to a pint, is also given according to M. Le Febvre's method. A table spoonful of this solution, mixed with a little syrup of poppies and half a pint of milk, is directed to be taken in the morning fasting, and the frequency of the dose increased until six spoonsful be daily taken. As a rule, arsenical preparations should be given soon after a meal, and by no means on an empty stomach.

As an external application, the arsenious acid has been long employed in cases of cancer; and has certainly done more to improve the ulceration, and give it a disposition to contract and heal, than any other external application; but its employment, however, is not devoid of danger. It has been sprinkled, upon the sores, in the form of powder, consisting of one part of arsenious acid and ninety-nine parts of calomel.[3] When the acid has been less diluted with other powders, the most violent pain follows this mode of applying it; and in some instances, probably from its absorption, the general system has been dangerously affected. The more usual mode of using it is in the form of a lotion, composed of eight grains of the acid, and the same quantity of carbonate of potassa, dissolved

[1] *Asiatic Researches,* 8vo. 5th edit. vol. ii. p. 158.
[2] *Dr. Kellie, Edin. Med. and Surg. Journ.*
[3] Dupuytren's powder.

in four fluid ounces of water; or as an ointment, formed by rubbing together one drachm of the acid, one drachm of sublimed sulphur, and eight drachms of spermaceti ointment.[1] These applications produce little pain and irritation; they cause the diseased parts to slough off, and they amend the fœtid discharge; but although to a certain extent they produce the most beneficial effects, yet the instances in which a cure has been effected are very rare; and they sometimes convey into the habit enough of the acid to produce much mischief. Several cases are recorded in which the same symptoms followed, as when poisonous doses are taken into the stomach.[2]

Arsenious acid is not unfrequently the cause of death, from accidents occurring to those artists who use it in their manipulations; as glass-makers, dyers, and workers in gold; or from ignorance of the proper dose of its preparations when medicinally used; or from the employment of it as a poison. The symptoms which occur are either those of inflammation of the stomach, incessant vomiting, purging, a sensation of heat, and pain of the stomach[3]; constriction of the throat, an increased flow of saliva, and great heat of the mouth; rapid sinking of the pulse, which is at first, however, full, hard, and frequent, cold sweats, delirium, coma, tremors of the limbs or tetanic symptoms, and death; if the quantity be not sufficient to produce speedy dissolution, the principal operation of the poison is displayed on the nervous system: both the brain and the spinal cord being affected. The first-mentioned symptoms are often absent, or are succeeded by paralysis, hectic, syncope, and other symptoms of extreme debility.[4] When death takes place, symptoms of putridity are said soon to present themselves; but this is not always the case, although the body is often marked with livid stripes, and covered with ecchymoses: and on dissection, the stomach often, although not always, is found to be either abraded, or completely eroded in several parts; with appearances of inflammation extending through the whole abdominal viscera; often extravasation of blood into the cellular tissue of the canal, ulceration, softening of the mucous tunic, and occasionally gangrene. The *heart* is flabby, with red spots in the substance, and the pericardium contains serum. In the thorax the pleura is red, and its sac often containing serum; the *lungs* are congested, and the lining membrane of the air tubes is inflamed, appearances that explain the cough and pains of the chest which occasionally occur in

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[1] Sir A. Cooper's ointment.

[2] See a cure by M. Roux, *Nouv. Elem. de Méd.*; and several collected by M. Wibmer, *Die Wirkung der Arzneimittel und Gifte.* See also Orfila's *Toxicol. Générale*: *Phil. Trans.* 1812, p. 205.

[3] In a case detailed by Dr. Yelloly, no pain of the stomach, convulsions, nor delirium occurred, although it terminated fatally. — *Edin. Med. and Surg. Journ.* v. 389.

[4] On this subject our readers will find much practical information in the *London Medical Repository*, vol. v. p. 97., and still more in Dr. Christison's excellent work *On Poisons*, p. 177.; also in the work *On Poisons* by Dr. Taylor.

poisoning by arsenious acid. In the cranium the *brain* is found congested; but when death is less the consequence of inflammation than of a peculiar and immediate influence of the poison upon the nervous system, no morbid change is discoverable in that organ on dissection. Particles of the acid are occasionally found adhering to the abraded parts of the villous coat of the stomach.

Various substances for counteracting the poison of arsenious acid have been recommended. The only one, which really deserves the name of antidote, is the *hydrated sesquioxide of iron,* which was first proposed by Dr. Bunsen and Dr. Berthold of Gottingen. It appears to act chemically, and thus to render the poison inert. It is best used in a moist state, and must be administered in large quantity, namely, a table spoonful every 5 or 10 minutes.[1] Its exhibition does not preclude the use of an emetic, which is requisite to free the stomach even from the antidote. Whatever antidote is adopted, the stomach should, in all cases, be immediately evacuated; and the best mode of doing this is by means of the stomach pump, administering large draughts of tepid mucilaginous fluids. Lime water, or chalk and water, if at hand, should always be employed, with the pump. Lime water proves useful by coating the particles of the white arsenic with an arsenite of lime, which is nearly insoluble, and consequently almost inert.[2] Dr. Yelloly, reasoning on the probability that the inflammation induced is often the cause of death, even after the stomach is freed from the whole of the poison, suggests the propriety of early blood-letting in these cases.[3] Opium, camphor, and ether may be employed to quiet the nervous irritability, and ammonia to stimulate the heart.

Officinal preparations.—*Acidum Arseniosum purum,* D. *Liquor Potassæ Arsenitis,* L. *Liquor Arsenicalis,* E. D. *Liquor Arsenici Chloridi,* L.

DETECTION OF ARSENIC.

As medical men are often called upon in courts of law to establish the fact of white arsenic (arsenious acid) having been used as a poison, it is necessary to know the best tests by which it may be recognised. If on searching in the stomach, or among its vomited contents, any of the suspected poison, in powder, be discovered, a small portion of it may be thrown upon a hot coal; if the vapour has the odour of garlic, we may presume that it is arsenious acid. But to verify this presumption a little of it must be mixed with three times its weight of black flux, composed of one part of finely-powdered charcoal, and two parts of dry carbonate of potassa; or, to a grain of the powder add a grain of charcoal, and a grain of dried carbonate of potassa. These mixtures must be next put into a thin glass tube, about four inches in length and 1-4th inch in diameter, hermetically closed at one end (*fig. a*, p. 154.). The open

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[1] *Edin. Med. and Surg. Journ* vol. liv. p. 106—112.

[2] See our experiments on this subject, in the *London Med. Repos.* vol. viii. 157.

[3] *Edin. Med. and Surg. Journ.* vol. v. p. 392.

extremity must then be slightly plugged with a piece of paper, taking care to preserve clean the upper portion of the tube, by introducing the powder by means of a small funnel (*fig. b*), or, by lining the tube with a cylinder of clean white paper, and afterwards withdrawing it. The tube, being thus charged, should be kept for a quarter of an hour in the flame of a spirit lamp, heating it first above the bulb, and then holding the bulb steadily in the flame of the lamp; when, if the powder contain arsenious acid, metallic arsenic will sublime, and be found lining a part of the inside of the tube as a brilliant metallic ring. The upper part of the material should always be heated first with a small flame; then, the wick of the lamp being drawn up, the heat should be applied to the bottom of the tube. That the sublimed matter is arsenic may be proved by volatilizing a small portion of the reduced metal mixed with charcoal, on a red-hot iron, and observing whether it present the garlic odour peculiar to the vapour of metallic arsenic: or if the crust be small, by cutting off the bulb of the tube, and heating the tube so as to oxidize the crust; and then testing the acid by the under-mentioned tests. Care must be taken not to mistake a charcoal crust for the metallic crust of arsenic; the former has not the crystalline texture, nor the iron-grey, metallic lustre of the latter, when examined by a good lens; nor can it be oxidized by heating it in the tube, nor arsenious acid in crystals be formed.

When the poison is found in a large quantity, it should be further tested by dissolving a small portion of it in two drachms of boiling rain or distilled water, with three grains of carbonate of potassa, or, what is to be preferred, the carbonate of ammonia, then adding to this a warm solution of five grains of sulphate of copper, which will produce a lively grass-green precipitate if arsenic be present; and if this precipitate be heated in a test-tube with a little wax, it will sublime in the form of metallic arsenic. A solution of some of the suspected poison may be made, without the addition of an alkali, and tested with the *ammoniaco-sulphate of copper*[1], which immediately throws down a beautiful apple-green precipitate, the arsenite of copper, and detects one part of the acid in 5 200 of water; or with the *ammoniaco-nitrate of silver*[2], which throws down a sulphur-yellow arsenite of silver; when the acid is in the proportion of one part in 400·000 of water. When no powder is discovered in the stomach, its contents and the vomited

[1] The ammoniacal sulphate of copper is prepared by precipitating a strong solution of sulphate of copper, by means of ammonia, then partly re-dissolving the precipitate by an excess of ammonia.

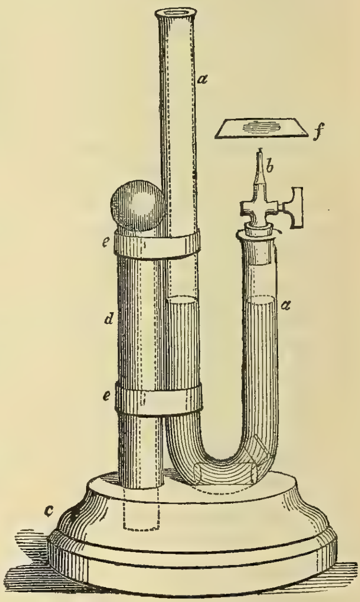
[2] Prepared in the same manner as the above, substituting nitrate of silver for sulphate of copper: it should not cause a precipitate with solution of phosphate of soda.

matters may be boiled with distilled water, with the addition of some pure potassa, and filtered; and then a warm solution of the sulphate of copper, as above described, added to it. Mr. Phillips, however, has shown that if the sulphate contain any oxides of iron, it will afford a green precipitate, although no arsenic be present. To prevent this fallacy, he directs the potassa to be added to the sulphate of copper first, and this mixture dropped into the suspected solution, when the blue precipitate will become green, if arsenious acid be present. The test with nitrate of silver was first proposed by Mr. Hume[1]; one part of the suspected poison, and three parts of carbonate of potassa may be dissolved in a sufficient quantity of rain or distilled water at 212°; and the surface of this solution slightly touched with a stick of nitrate of silver. If arsenious acid be present, a sulphur-yellow coloured precipitate will be seen falling rapidly from the point where the nitrate is applied. In our experiments we have found that the sixtieth part of a grain of the acid is clearly discovered in two ounces of water by this test. This precipitate, which is arsenite of silver, should afford, as already stated, when heated, indications of metallic arsenic. All these experiments should be performed in the daytime, and the precipitate as well as the fluid examined by reflected, not transmitted, light.[2] Objections have been raised against the *nitrate* and the *ammoniaco-nitrate of silver,* because the presence of the alkaline phosphates in the suspected fluid would produce precipitates of a similar colour when no arsenious acid is present; and if chloride of sodium, or any other chloride, were present, the test could not be employed, on account of the copious precipitate of chloride of silver which these produce with the nitrate. The first objection is obviated by making the trial on paper, as recommended by Dr. Paris: drop a little of the suspected fluid on writing-paper, and draw several times over it a stick of lunar caustic; which, if arsenious acid be present, will leave a streak of colour, that becomes a very bright queen's yellow, if brushed with some liquid ammonia; but if no arsenious acid be present, and only alkaline phosphates, the streak will be uniform, and in a few minutes will fade into a sad green, and gradually become black. Dr. Marcet has shown us how to obviate the difficulty with regard to the chlorides, by adding to the suspected fluid dilute nitric acid, and then applying the nitrate of silver to its surface until no more precipitation is produced; by which means the whole of the hydrochloric acid is removed: and as the arsenite of silver remains in solution, it is rendered evident by a yellow precipitate being instantly formed on the addition of ammonia. A still better method is to precipitate all the chlorides by nitrate of silver, leaving the mixture at rest to

[1] *Philosophical Mag.* May, 1809.
[2] *Bostock, Edin. Med. and Surg. Journ.* vol. v. p. 170.

become clear, then filtering, and touching the surface of the fluid with a glass rod dipped in ammonia; if any arsenite of silver be present, it will be directly recognised by the yellow precipitate.

But there is great difficulty in detecting the presence of the poison in the stomach. Besides examining the contents of this viscus by filtration and dilution, if no arsenious acid can be detected, Orfila advises the viscus to be cut in pieces, and then separately examined[1], by boiling the fragments in water and testing the decoction. In this case, the fragments should be boiled in distilled vinegar and water; and then a current of sulphuretted hydrogen gas passed through the filtered decoction, which will diffuse a fine yellow colour in the fluid if any arsenious acid be present: this, the terquisulphuret of arsenic, when the fluid is boiled to drive off any superfluous sulphuretted hydrogen gas, falls as a lemon-yellow-powder, which, if dried and mixed with black flux, and reduced, yields metallic arsenic. Another excellent test consists in throwing some of the suspected fluid into a mixture of one part of sulphuric acid and six parts of water, and, having added some *pure* zinc in the apparatus figured in the marginal cut, set fire to the gas as it issues from the jet, and hold over it a plate of glass or of porcelain: if any arsenious acid be present in the fluid, a spot of metallic arsenic surrounded by arsenious acid will be obtained. The one hundred and fiftieth part of a grain can be detected by this method.[2]



Mr. Marsh's apparatus is a glass tube, *a*, *a*, bent into the form of a syphon, the shorter leg being five inches and the longer eight inches in length. A stopcock, *b*, ending in a jet of a fine bore, passes tightly through a hole in the axis of a soft sound cork, which fits air-tight into the opening of the lower bend of the tube: it may be rendered more tight by common turpentine luting. The apparatus is fixed on the stand, *c*, and attached to the pillar, *d*, by two elastic slips of Indian rubber, *e*, *e*. When the apparatus is to be used, the fluid to be examined, mixed with diluted sulphuric acid, is to be poured into the long

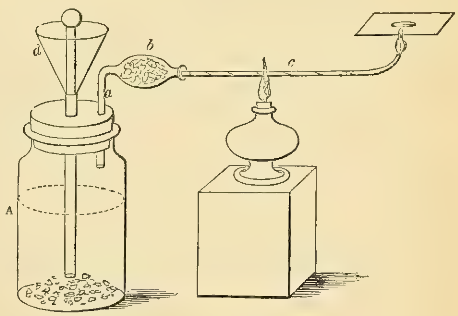
[1] *Traité des Poisons*, &c., par M. P. Orfila, vol. ii. p. 169.

[2] This beautiful test was suggested by Mr. Marsh of Woolwich.

leg until it stands in the short one about a quarter of an inch below the cork. A piece of glass rod, an inch long, is then to be put into the short leg, and afterwards a piece of sheet zinc bent double, which will fall down until stopped by the glass rod. The stopcock being then inserted and shut, until the short limb is full of gas, it must next be opened, and the gas that issues lighted. If arsenious acid be present, metallic arsenic and a circle of oxide will be formed on the piece of glass, *f*, held over the flame.

In this process the arsenious acid is deprived of its oxygen, and its metallic base combines with the hydrogen, forming *Arseniuretted Hydrogen gas* (ASH_3), which is decomposed and reduced to metallic arsenic, when inflamed in atmospheric air, or submitted to a red heat.

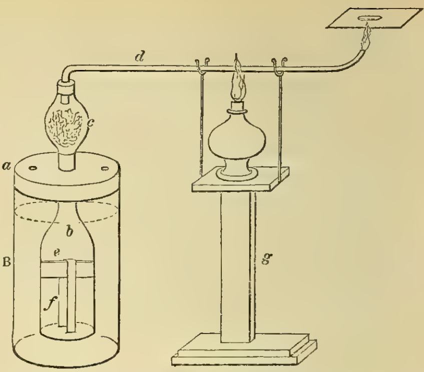
Some disadvantages are connected with Marsh's instrument: 1st. The quantity of gas generated is so small that it is difficult to obtain the impressions; 2d. The salts of antimony evolve, when treated with it, *Antimoniuretted Hydrogen gas*, which, when burnt, forms on the glass or porcelain palette a metallic stain resembling arsenic. The first objection has been met by blowing a globe on each limb of the syphon tube; the second by employing the apparatus figured in the marginal cut. To the bent tube, *a*, the tube with a bulb on it, *b*, containing asbestos, is affixed a long tube, *c*, drawn out at the end to a capillary point, which is turned up; *d* is a stoppered funnel, for introducing the acid. A piece of copper wire should be wound round the tube *c*, to support it. A little beyond the part, *d*, where the flame



of the lamp plays upon the tube, a ring of metallic arsenic is formed; and when the gas at the apex of the tube is lighted, impressions may be taken, as in using Marsh's instrument. If the solution contain tartar emetic instead of arsenic, this is known by the gas burning with a yellow instead of a blue flame, and by the formation of two metallic rings instead of one, when the heat is continued. The gas extricated in this instrument, however, is liable to explosion from its admixture with atmospheric air. I have, therefore, suggested a modification of the bell-glass apparatus (*see marginal cut* B, p. 158.), which prevents such an accident from occurring. It is of the utmost importance in using these instruments, that both the zinc and the sulphuric acid should be pure.

When any of the solution of the poison which has been exhibited can be procured, more satisfactory results will be obtained from the

examination of it than from that of the contents of the stomach. If a white powder be found in it, the most satisfactory proof is that of reducing this to the metallic form, as already described; but, if the whole of the arsenic be dissolved, it must then be tested by the apparatus B, and the different re-agents.



B, a jar, 7 inches high, and 3 inches wide.
a, a wooden cover, made to fit tight, perforated with two small air-holes, and transmitting the tube of the bell, *b*; a piece of wood, *e*, on which is hung a stripe of pure zinc, *f*, is fixed across the bell.
c, a hollow bulb filled with asbestos.
d, a tube 12 inches long, supported by the wires affixed to *g*, the stand of the lamp.

The latest test proposed is by M. Hugo Reinsch. It consists in acidulating the fluid suspected to contain arsenious acid with hydrochloric acid, and boiling it with slips of metallic copper. If arsenic be present, the copper becomes covered with a steel-grey crust ($AsCu_3$). This test will not detect arsenious acid in sulphuric, phosphoric, or acetic acid, unless a few drops of hydrochloric acid are allowed to fall on the copper in the fluid whilst it is still warm, when it becomes instantly covered with the crust of the metal. In testing the contents of the stomach, they should be digested with *pure* hydrochloric acid diluted with an equal weight of water, then boiled and filtered, and the liquid treated as above mentioned with the slips of copper. To verify the test, M. Reinsch recommends the slip of copper to be washed with water in the same vessel in which it has been boiled, and dried over the flame of a candle. It is then to be slipped down to the centre of a glass tube about sixteen inches long, drawn out at one end to a capillary orifice, and the other closely adapted to a small bent tube closed at its lower end with a perforated cork. The part of the tube containing the copper is then to be heated with a spirit lamp, when the arsenic becomes acidified, and arsenious acid sublimes in brilliant crystals; which may be tested by the ordinary liquid re-agents.[1] This process is simple, and sufficiently delicate for the examination of the poison in mixed fluids. The crust appears to be a compound of copper and arsenic, probably having the formula $AsCu_3$.

The results from no single test, even the most perfect, should be relied upon: and as a knowledge of the appearances produced

[1] Extract from *Repertor. fur Pharm.* vol. xxvii. p 13.; in the *Lond. and Edin. Monthly Journ. of Med. Science*, No. 25. 1843.

by the four principal re-agents usually employed must greatly facilitate such examinations, I have constructed the following table from actual experiments, comparing the results obtained from solutions of arsenious acid with those from solutions of corrosive sublimate, potassio-tartrate of antimony, and chloride of barium, which are the only substances likely, in the state of powder, to be mistaken for arsenious acid. It is necessary to remark that the broth employed was made with beef, and contained a moderate proportion of carrots, turnips, and onions, and that the coffee and the tea contained milk and sugar in the usual proportions employed in these beverages.

I shall add here the plan proposed by my late truly excellent friend and colleague, Dr. Turner, and by Professor Christison of Edinburgh.[1] They direct the stomach to be cut in pieces and boiled, in a porcelain vessel, in filtered water mixed with a small quantity of liquor potassæ; then to filter the fluid, and add to it acetic acid sufficient to acidulate it, and again to boil it to free it from any caseum it may contain, and which is to be separated by a second filtration. This acidulated solution is next to be subjected to a stream of sulphuretted hydrogen gas, then boiled, and the precipitate after filtration, collected, washed with distilled water, and dried: it is then to be put into the small glass tube (*fig. a*, page 154.), being careful that none of it touch the side of the tube; to prevent which it should either be guarded, by introducing a roll of paper into the tube, or the dried sulphuret should be passed through the small funnel, *b*. Some black flux should now be introduced; and the lower part of the tube cautiously heated over the flame of a spirit-lamp, and afterwards the bulb, until it be raised to full red heat. If arsenious acid was the poison, the decomposition of the sulphuret will afford a ring of metallic arsenic on the tube: but to determine this with more certainty, Dr. Turner proposes to separate the bulb of the tube and any portion of it containing the flux, by melting the tube and drawing it out. The crust in the remaining part is next to be driven up and down by the heat of the spirit-lamp, when, if it be arsenic, it will be formed into detached octahedral crystals of the acid, white, translucent, and easily recognised under the microscope. If more proof be wanted, these may be dissolved and tested with ammoniaco-nitrate of silver, and ammoniaco-sulphate of copper.[2] But the certainty and the simplicity of M. Reinsch's process set aside almost every other test. In legal inquiries, however, it is always proper to corroborate the results of any one test by those of several other tests.[3]

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[1] *Christison on Poisons.* [2] *Edin. Journ. of Med. Science*, vol. ii. p. 254.

[3] For further details on this subject, see the many works on Toxicology, published both in this country and abroad.

COMPARATIVE TABLE of the Precipitates obtained from Solutions of Arsenious Acid, of Bichloride of Mercury, of Potassio-Tartrate of Antimony, and of Chloride of Barium, with different Tests.

1st TEST.—WATER SATURATED WITH SULPHURETTED HYDROGEN GAS.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from Solutions of CHLORIDE OF BARIUM.
Water - -	Bright lemon yellow, deepened by the addition of a few drops of strong acetic acid.[1]	Yellow at the instant of its formation, but soon becoming blackish. On shaking the tube it changes to a dirty white.	Orange, curdy, partly suspended, partly thrown down. Ultimately bright orange.[3]	Heavy, and of a dirty dark brown colour.
Broth - -	Scarcely any at first, but on adding a few drops of strong acetic acid, a pale yellow.	Whitish yellow at first, quickly changing to mixed clots of yellow, black, and white.	Pale orange at first, soon changing to a deeper bright orange.	Dirty pale brown, heavy.
Milk - -	Little change; but on the addition of a drop of strong acetic acid, a straw-coloured precipitate.	Light ochre, requiring for its formation a large quantity of the test.	Golden yellow, with a shade of orange.	Dirty nankeen, with a shade of brown.
Tea - -	At first very pale yellow; after some time, a pale greenish yellow. The precipitate was curdy.[2]	Brownish white and yellow, mixed.	Deep orange, curdy, slowly formed: the supernatant fluid yellow.	Dirty light brown, deepening as it fell.
Madeira Wine	Turbid, pale yellow, the colour of the wine destroyed.	Muddy, gradually displaying small floating black flocculi.	Pale orange, long suspended.	The chloride mixed with white wine is milky.—Not tested.
Port Wine -	Turbid, pale yellow: the precipitate slowly formed.	Nearly as in the white wine, like clouds through the purple of the wine.	Dark, dirty orange-brown.	Pale brown, heavy.
Coffee - -	A deep golden yellow.	Brownish black.	Deep orange-brown.	Not tested.
Gruel - -	Pale yellow, suspended.	Light brown, slowly formed.	Pale orange.	Not tested.

[1] This precipitate, dried upon a filter, and heated with some caustic potassa in a slender test tube, is decomposed in a few seconds, forming a sulphuret of potassium, whilst the arsenic is volatilised in its metallic form, and adheres to the sides of the tube.—*Orfila.*

[2] All substances containing tannic acid in solution greatly impair the solvent influence of fluids on arsenious acid.

[3] Dr. Pereira states, that, when the solution of tartar emetic is very dilute, and sulphuretted hydrogen gas passed through it *only for a few seconds*, the precipitate is of a lemon yellow, closely resembling that produced by arsenious acid.—*Med. Gaz. April*, 1836.

II. SOLUTION OF SULPHURET OF POTASSIUM.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from Solutions of CHLORIDE OF BARIUM.
Water - -	White, with a faint tint of sulphur-yellow, when a large quantity of the test was used.[1]	Black, mottled with yellow.	Bright orange.	Deep olive-green.
Broth - -	Pale, but bright, sulphur-yellow.	Clotted, heavy, black, mottled with grey.	Dull orange, heavy.	Pale-brown, partly suspended.
Milk - -	Bright golden-yellow.	Black, clotted.	Orange.	Brown, greenish when the mixture was shaken.
Tea - -	A beautiful yellow.	Brownish-black.	Reddish-orange, flocculent.	Not tried.
Coffee - -	A deep golden-yellow.[2]	Nearly black.	Deep brownish-orange.	Not tried.
Madeira Wine	Sulphur-yellow.	Dirty white, or slate colour.	Beautiful bright orange.	Vide 1st Table.
Port Wine	Fawn colour.	Slate colour, with violet supernatant fluid.[3]	Dark brown, with a tinge of orange.	Violet, heavy.
Gruel - -	Bright queen's yellow.	Black dense clots.[4]	Orange clotted.	Dusky yellowish-green.

III. SOLUTION OF AMMONIACO-SULPHATE OF COPPER.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from Solutions of CHLORIDE OF BARIUM.
Water - -	Beautiful grass-green. It completely disappeared on the addition of a few drops of strong acetic acid.[5]	White, thick and heavy.	Pale whitish-blue, very little thrown down.	Copious whitish-blue.
Broth - -	Beautiful pale green, suspended.[6]	White, curdy, partly suspended, partly thrown down.	Pale whitish-blue, with a tint of green.	Opaque, glaucous.
Milk - -	Pale greyish-green.	Bluish-white, curdy.	Whitish-blue.	Curdy white, with a tinge of blue.
Tea - -	Obscure olive, but scarcely a precipitate.	Dirty yellowish-white, curdy.	Muddy, pale bluish-green.	Greyish, heavy, supernatant fluid, yellowish-green.
Coffee - -	Dark grass-green.[7]	Dirty white.	Dirty bluish-green.	Not tried.
Madeira Wine	Greyish, with a slight tinge of green.	Heavy clotted white, with a tint of green.	Æruginous blue.	Vide 1st Table.
Port Wine -	Clotted, heavy, dark greenish-grey.	Heavy, clotted, bluish-grey.	Heavy, dirty slate-blue.	Dirty violaceous-grey.
Gruel - -	Beautiful grass-green.	Pale bluish-white.	Pale bluish-green.	Pale bluish-green.

IV. SOLUTION OF AMMONIACO-NITRATE OF SILVER.

Solvents.	Precipitates from Solutions of ARSENIOUS ACID.	Precipitates from Solutions of CORROSIVE SUBLIMATE.	Precipitates from Solutions of TARTAR EMETIC.	Precipitates from Solutions of CHLORIDE OF BARIUM.
Water - -	Copious bright sulphur-yellow.[8]	Dull yellowish-white, clotted, changing to dirty white.	Pale brown.	White, heavy; soon blackening.
Broth - -	White (owing to the chloride of sodium), but yellow when treated with nitric acid.	White, copious.	Brownish, mixed with much muriate of silver.	White, dense, curdy.
Milk - -	White, with a tint of yellow.	Dirty-white.	Very pale, scarcely visible brown.	Not tried.
Tea - -	Yellowish-white, which soon blackens.	Dirty-white.	Dirty-brown.	Not tried.
Coffee - -	Yellow, remaining unchanged.	White, changing to black.	Not tried.	Not tried.
Madeira Wine	Pale sulphur-yellow.	Dirty white, changing to black.	White.	Vide 1st Table.
Port Wine -	White, becoming brown on exposure to the light.	Idem.	Dirty-white.	Heavy, dirty-white.
Gruel - -	Yellowish.	Dense, dirty-white clots.	Not tried.	Dense, clotted-white.

[1] This sulphuret, added to a solution of the phosphates, throws down a greenish-yellow precipitate, the supernatant fluid being yellow and turbid.

[2] Lime water, also, added to coffee containing arsenious acid, throws down a yellow precipitate; although it precipitates the watery solution of arsenious acid white.—*Orfila.*

[3] Corrosive sublimate cannot be exhibited in port wine with an intention to commit murder (except by a self-murderer), as it changes the colour of the wine to pale violet.

[4] All the precipitates by the sulphuret, when dried, and heated in a tube with iron filings, afford metallic mercury, which forms globules on the sides of the tube.

[5] This test is capable of detecting arsenious acid in a solution containing $\frac{1}{110000}$ of its weight.—*Orfila.*

[6] It has been suggested, that onions boiled in broth, or eaten so as to impregnate with their qualities the contents of the stomach, might produce the same effects on ammoniaco-sulphate of copper, as if arsenious acid were present; but although the fluid is tinged a green colour, yet no precipitate forms.

[7] Dr. Porter, of South Carolina, says, that sulphate of copper with ammonia produced the same coloured precipitate in coffee which contains no arsenious acid.—*American Journ. of Science*, vol. iii. p. 354.

[8] A similar precipitate is formed by nitrate of silver, in a solution of any of the phosphates, and with chromate of potassa; but the fact of the precipitate being occasioned by arsenious acid is easily ascertained by testing a fresh portion of the solution with lime-water. If it contain arsenious acid, a copious white precipitate will be thrown down; if a phosphate only, there is scarcely any change, or at the most a translucent flocculent precipitate, which remains long suspended. A method of employing this test was suggested by Dr. Paris: namely, to put upon a piece of clean white paper a broad streak of the suspected fluid, and then run lightly over it a stick of lunar caustic; or the streak may be brushed lightly over with liquid ammonia, immediately after the application of the caustic; if arsenious acid be present, a bright queen's yellow is instantly produced, which remains permanent for nearly an hour; but when the lunar caustic produces a bright yellow before the ammonia is applied, we may suspect the presence of some phosphate.

ARTANTHE ELONGATA, *Dub.* Matico Plant; called also Piper Angustifolium (*Ruiz* and *Pavon*).

This plant has been made officinal by the Dublin College, under the name of *Artanthe elongata.* It belongs to the natural order *Piperaceæ,* and to the Linnæan class and order *Diandria Monogynia.* It grows in Peru. The plant is a shrub of about twelve feet high, with jointed stem and branches. Leaves short-stalked, harsh, oblong-lanceolate, acuminate, tessellated on the upper surface on account of the sunken veins; pubescent beneath. The spikes are solitary, cylindrical, and opposite the leaves; the bracts lanceolate, and the flowers are hermaphrodite. As imported, Matico occurs in lumps or masses contained in serons, consisting of the leaves, stalks, and spikes (ripe and unripe), compressed more or less. The leaves are from two to eight inches long, not unlike sage, and easily powdered. The odour is aromatic, somewhat like cubebs.—*Lindley and Pereira.*

Qualities.—Matico yields on analysis, a soft resin of a dark green colour, a volatile aromatic oil, and a bitter principle called *Maticine,* with other unimportant ingredients; no tannic or gallic acid has been discovered in it. Its watery infusion gives rise to an olive-green precipitate with persalts of iron.

Medical properties and uses.—Matico has been highly esteemed as an astringent and styptic; but it is questionable whether it possesses these properties in a higher or even so high a degree as some other remedies of the class. As an external application to staunch blood, applied to leech bites, &c., its efficacy probably depends on the mechanical structure of the leaf, the under-surface of which is pubescent. Its value was, at one time, thought to depend on some astringent principle, as gallic acid, contained in it; but analysis has not detected either tannic or gallic acids. Dr. Neligan states that he has found the tincture useful in the treatment of catarrh of the bladder in the aged, and hence it appears to possess properties similar to those of other plants belonging to the order *Piperaceæ.* It has been used as an internal styptic in most forms of passive hæmorrhage, either in the form of powder, or of infusion or tincture.

Dose of powder gr. x. to ʒ ss.

Officinal preparations.—*Infusum Matico,* D. *Tinctura Matico,* D.

ARTEMISIA. *Spec. Plant. Willd.* iii. 1815.

Cl. 19. *Ord.* 2. Syngenesia Polygamia superflua. *Nat. Ord.* Asteraceæ.
G. 1473. *Receptacle* subvillous or almost naked. *Seed-down* none. *Cal.* imbricate, with roundish converging scales. *Cor.* without rays.
*** *Herbaceous, with the stem somewhat branching, the flowers in panicles, the leaves compound.*
Species 26. A. *santonica.* Tartarian Southernwood. *Med. Bot. 3d edit.* 61. *t.* 23.

Species 63. A. *vulgaris.* Common Wormwood. *Med. Bot. 3d edit.* 54. *t.* 22. *Smith's Flora Brit.* 864.

**** *Shrubby, with a branched stem and simple leaves.*

Species 71. A. *Sinensis.* Chinese Wormwood.

1. ARTEMISIA SANTONICA.

Officinal. ARTEMISIA SANTONICA. The tops and seeds of Tartarian Southernwood.

Syn. Sementine (*F.*), Tartarisches Beyfus, Wurmsamen (*G.*), Santonico, Seme Santo (*I.*).

This Artemisia is said by De Candolle to be *Var.* B. *suaveolens* of A. *maritima;* by M. Batka it is referred to A. *Sieberi.* But the opinions upon this subject are not very satisfactory; and the specimens in the shops are made up of fragments of flowers and pedicels.

According to the analysis of M. Wackenroder, what are termed *semen Santonicum* contain a *bitter principle,* 20·25; *brown, bitter resin,* 4·45; a *green, acrid, aromatic resin,* 6·65; *cerine,* 0·35; *gummy extractive,* 15·50; *ulmin,* 8·60; *malate of lime* and *silex,* 2; *woody fibre,* 35·44; and *earthy matter,* 6·70 = 100 parts. A principle *Santonine* can be obtained from the Artemisia *Santonica,* or Artemisia *contra,* in four-sided prisms, white, very brilliant, without odour or taste; insoluble in water, but soluble in alcohol and ether. When the crystals are exposed to the light, they become yellow, but without undergoing any change in composition. It is volatile, possesses slight acid properties, but forms with bases very feeble compounds.

Formula $C_{30}\ H_{18}\ O_6$. It is converted into succinic acid by the action of nitric acid.

Medical properties and uses.—Worm seeds, as they were called, were formerly contained in the Pharmacopœias, but now rejected: they were employed as anthelmintics. At the present time Santonine is often administered for the same purpose, and given in doses of from four to six grains.

2. ARTEMISIA ABSINTHIUM.[1]

Officinal. ABSINTHIUM, *Lond. Edin.* The flowering herb of Wormwood.

Syn. Absinthe commun (*F.*), Wormuth (*G.*), Assenzio (*I.*), Alsem (*Dutch*), Malurt (*Dan.*), Malert (*Swed.*), Piolun (*Pol.*), Polin (*Russ.*), Artemisio axenjo (*S.*), Losna (*Port.*).

Common wormwood is an indigenous perennial plant, growing in dry, waste places, and flowering from June to August. The greater part, however, of that which is used for medicinal purposes is cultivated in the physic gardens. The root is somewhat woody,

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[1] Ἀψίνθιον Dioscoridis.

and branched. The stems rise nearly erect to the height of two or three feet; are branching angled, and furrowed, with the summits panicled. The lower leaves are bipinnate; the upper pinnatifid or digitated; with oblong, obtuse, very entire segments. The racemes are pendulous, and the flowers pedicellated, nodding, hemispherical, and of a brownish-yellow colour. The florets of the disc are numerous; but those of the ray few: and the receptacle is covered with white silky hairs, shorter than the calyx. The upper part of the plant withers in winter, but the lower survives. It is collected in June and July, whilst the plant is in flower.

Qualities.—The odour of common wormwood is strong, penetrating, and although fragrant, yet to many persons very disagreeable: the taste is intensely bitter, slightly pungent or aromatic, and nauseous. These qualities are preserved in the dry plants; and are given out both to water, to alcohol, and to wine; and a dark green volatile oil, on which the odour depends, is obtained by distillation with water. This oil has a composition represented by the formula $C_{20} H_{16} O_2$. The watery infusion of the plant has a pale olive colour; sulphate of iron and of zinc slowly deepen it to a black; and acetate of lead throws down a yellowish-green flocculent precipitate; but it is not affected by potassio-tartrate of antimony. The active parts of the plant seem to be azotized *extractive, volatile oil,* which is not in the least bitter, and a small portion of *intensely bitter resin.* Kunsmuller[1] found in the residue of twelve ounces of the plant after infusion, besides other things, fifty-nine grains of carbonate of lime. Braconnot found also, *albumen, starch, absinthate of potassa, nitrate* and *sulphate of potassa,* and *chloride of potassium.*

The active principle of the wormwood has been found to be a body, called *absinthine* or *absinthic acid,* which, when pure, occurs as a yellowish powder, having an acid reaction, with slight odour of the plant, soluble in alcohol, less so in ether, soluble in strong acetic acid, but partially precipitated from its solution in this menstruum by water; dissolving readily in solutions of the fixed alkalies and ammonia, forming yellow solutions. Composition (dry), $C_{16} H_{10} O_4 + H O$.

Medical properties and uses.—Common wormwood is tonic, and anthelmintic; and when externally applied, it is said to be discutient and antiseptic. It is taken into the circulation. It has been used with advantage as an antiperiodic in intermittents, gout, scurvy, and dropsy; and although modern practitioners will scarcely rely on its efficacy in these complaints, yet it is undoubtedly of value as a stomachic in atonic dyspepsia and hypochondriacal affections. When it is desirable to free the remedy

[1] *Ann. de Chim.* vi. p. 35.

from its narcotic property, it should be given in decoction, as the boiling dissipates the volatile oil on which that property depends. The powdered root is much relied upon in Germany for the cure of epilepsy.[1] I have ordered the powder of Artemisia *vulgaris* with decided advantage in the sympathetic form of that disease. It must be powdered only when wanted for use: the dose for an adult is from gr. l. to gr. lxx. This dose may be given in hot beer an hour before the paroxysm is expected. The sensible effect is powerful sweating.[2] I have used the herbaceous part of the plant in the same manner with decided advantage. The dose in substance is ℈ j. to ℈ ij.; and of the infusion, made by macerating ʒ vj. of the plant in f ℥ xij. of boiling water, f ℥ j. to f ℥ ij. of which may be given three or four times a day.[3]

3. ARTEMISIA SINENSIS ET INDICA.

ARTEMISIA SINENSIS, Moxa Weed.[4] A. INDICA ET MOXA. Moxa.

Syn. Khi-ngai; Gaetsaou (*Chinese*).

This species of artemisia is a native of China, but it grows readily in the open air in this country. It is a shrubby plant; the leaves are tomentose, bipinnate, with linear obtuse leaflets, rising about two feet in height. The flowers, which are produced on the summits of the twigs, are in dense, frequently ovate, simple, involucred, globose heads: the involucre composed of membranous scales, scarious at the apex.

For the preparation of Moxa, the plant is collected early in the morning, when it is still wet with dew: it is next hung up, in a free current of dry air, in a shady place, until it is perfectly dry: the leaves are then bruised in a mortar, and afterwards rubbed between the hands until the downy part is separated from the woody fibre. It is this downy matter, rolled into cones, about the length and the breadth of the little finger, that constitutes the Chinese Moxa. The Chinese employ several other species of artemisia for the preparation of moxas: and in Europe moxas are now made of various materials; and almost any combustible will serve, if the combustion be maintained by blowing upon it; but those moxas which burn spontaneously are preferred. Cotton, dipped in a solution of nitrate of potassa, and rolled into little cylinders, is sometimes used: the pith of the sun-flower, Helianthus *annuus*, as it burns spontaneously, constitutes the greater part of the French moxas; and these are made either solid or hollow, the former being used when a deep eschar is not required; the latter when it is considered necessary. In Lapland moxas are prepared from a species of fungus, which is found on old birch-trees. The best moxas are prepared by dipping a piece of bibulous paper in a solu-

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[1] *Bull. de Pharm.* v. p. 549.
[2] *Hufeland's Journ.* 1824.
[3] Purl is an infusion of wormwood in ale.
[4] *De Candolle,* Prodr. vi. 121.

tion of diacetate of lead, drying it, and then rolling it up in the form of a cylinder. It burns well and steadily, leaving an ash of yellow oxide of lead.

Medical properties and uses.—Prepared Artemisia Sinensis, or any Moxa, burnt upon the body, acts as a powerful counter-irritant, allaying deep-seated pains and inflammation: it is, therefore, useful in gout, rheumatism, obstinate headache, vertigo, white swellings of joints, and many local diseases, in which counter-irritation proves useful. The most common mode of using moxa is to place the litle cone, or cylinder, into which it is rolled, upon the skin; and having set fire to the summit, to allow it to burn to the base. In some cases, however, it is not requisite to place the moxa on the skin, but only to hold it, in an ignited state, at a small distance from the affected part, moving it backwards and forwards. As far as our own experience authorises us to form an opinion, we prefer the use of the actual cautery to that of moxa; and if proper care be taken to guard the surrounding skin from the radiation of the caloric of the hot iron, by covering it with damp bibulous paper, the pain is less than that produced by moxa, whilst, at the same time, the slough is more perfect, and sooner thrown off. The best mode of applying the actual cautery is to cover the part with three or four doublings of cartridge paper, soaked in water, and then pressed between two boards. In this covering a hole is to be made, a little larger than the bulb of the iron to be employed. If the iron be made white hot, and applied quickly, whilst the surrounding parts are thus protected, little pain is caused by the application of the cautery; for the life of the part to which it is applied is instantaneously destroyed, and the radiation produces no effect on the surrounding skin.

ASARUM. *Spec. Plant. Willd.* ii. 858.

Cl. 11. *Ord.* 1. Dodecandria Monogynia. *Nat. Ord.* Aristolochiaceæ.

G. 925. *Calyx* three or four cleft, placed on the germen. *Corolla* none. *Capsule* coriaceous crowned.

Spec. 1. A. *Europæum.*[1] Asarabacca. *Med. Bot. 3d edit. t.* 66. *Eng. Bot. t.* 1083. *Smith, Flora Brit.* 509. *Hayne*, i. 44.

ASARUM EUROPÆUM; FOLIA. Asarabacca leaves. Not now officinal.

Syn. Asaret, Cabaret (*F.*), Hazelwurtzel (*G.*), Hazelwort (*Dutch*), Hasselurt (*Dan.*), Kopytnik (*Pol.*), Asaro, la bacchera (*I.*), Asaro de Europa (*S.*), Hasselört (*Swed.*), Asāroon (*Arab.*), Tuckir (*Hind.*), Mootriennjavia (*Tam.*).

This is a perennial plant, the geographical limits of which extend from 60° to 37° N. latitude: it is, consequently, a native of several parts of England, particularly Lancashire and Westmoreland; growing in woods and shady places; and flowering in May. The rhizome is creeping, fleshy, with branching fibrous roots. The

[1] Ἄσαρον Dioscoridis. The Arabic word *Asāroon* signifies *astringency.*

stem is short, round, simple, pubescent, generally bearing two leaves only, which are opposite, on foot-stalks three inches long, of a kidney shape, entire, somewhat hairy, and of a deep shining green colour. The flower is solitary, on a short terminal peduncle, of an herbaceous colour on the outside, and dusky purple within; and is in some degree hid under the leaves: the calyx is bell-shaped and three-cleft, with the points of the segments incurved: the filaments are produced beyond the anthers into a hook or little horn; the style is a cylindrical column, crowned with a six-parted, reddish stigma. The seeds are ovate, in a six-celled, inferior, coriaceous capsule.

As a great deal of the acrimony of asarabacca is lost by keeping, the leaves should be used in as recent a state as possible; but when well dried without the application of much heat, they keep.

Qualities.—The recent leaves are nearly inodorous: their taste slightly aromatic, bitter, acrid, and nauseous. The decoction is inert; but the watery infusion, which has the colour of brandy, possesses the sensible qualities of the leaves. Sulphate of iron changes the colour to a deep olive, throwing down a greyish precipitate. The recent root when distilled yields a volatile oil which smells like camphor; but this is not obtained from the dried root. According to the analysis of MM. Lassaigne and Fenueille, asarabacca contains *camphor*, an emetic principle resembling *cytisina*, a *volatile oil, fixed oil, citric acid, gum,* and *fecula.*[1] The recent root possesses emetic properties. Gräger, in a more recent analysis, found also *tannic acid, asarin,* the cytisina of Lassaigne, *extractive,* and *albumen.*[2]

Medical properties and uses.—The leaves of asarabacca are emetic, cathartic, and diuretic; but in modern practice they are never used except as an errhine; and, perhaps, as Dr. Cullen has remarked, they form the most useful species of this genus of local stimulants. A proper dose snuffed up the nose for a few successive evenings, at bed-time, occasions a copious discharge from the nostrils, which continues to flow for several days. They have been found particularly beneficial in cephalalgia, obstinate toothache, chronic ophthalmia, and lethargic affections. The dose of the powdered leaves is grs. iij. to grs. v., which should be repeated every night until the full effect is produced, avoiding exposure to cold during its use. Asarum operates as an emetic in doses of ʒ ss. to ʒ j.

ASSAFŒTIDA. Vide *Ferula Assafœtida.*
ASSAGRÆA OFFICINALIS. See *Helonias.*

ASPIDIUM. *Flora Britannica,* Smith, 1118.
Cl. 24. *Ord.* 1. Cryptogamia Filicis. *Nat. Ord.* Filicales.

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[1] *Journ. de Pharm.* vol. vi. p. 56.

[2] *Pharmaceutische Waarenkunde.*

G. 429. (*Smith.*) *Fructification* in roundish points, scattered, not marginal. *Involucre* umbilicated, open almost on every side.

** *Frons nearly bipinnate.*

Species 4. A. *Filix mas.*[1] Male Fern root. *Med. Bot. 3d edit. t.* 267. (*Polypodium Filix mas.*) *Eng. Bot.* 1458. *Smith, Flor. Brit.* Nephrodium *Filix mas* (*Richard*).

Officinal. FILIX, *Edin.* Rhizome of the Male Shield Fern.

Syn. Polypode commun, Fougere male (*F.*), Mannliche Waldfarren; Johanniswurtzel (*G.*), Varien mannetja (*Dutch*), Felce Maschia (*I.*), Polypodio helecho masculino (*S.*), Feto Macho (*Port.*), Trajan (*Swed.*), Bregne (*Dan.*), Passorotnik mugeiskoi (*Russ.*).

This is a common, indigenous, perennial plant, growing in woods and shady places, and flowering in June and July. Dr. Lindley, following Richard, refers it to the genus *Nephrodium.*[2] The root stock consists of many-matted fibres, forming a tufty or cespitose head, of a blackish colour, scaly and creeping. The leaves or fronds grow in circular tufts, from a foot to four feet in height, with the stype and midrip chaffy. They are of a bright green colour, lanceolate and pinnate. The pinnæ are at first alternate, increasing in size from the base towards the middle, then decreasing towards the summit of the leaf; each being deeply subdivided into linear, obtuse, parallel lobes, crenate on the edges, both sides smooth; thecæ numerous, like small dots on the back of each lobe, placed in two rows near the base, and distant from the edges; composed of a kidney-shaped shield or involucre, and a pale brown capsule, with a saffron-coloured elastic ring.[3]

Qualities.—The dried rhizome is nearly inodorous: the taste at first sweetish, then slightly bitter, sub-astringent; and mucilaginous when chewed. It varies much in its properties according to the season of the year in which it is taken up; and it becomes perfectly inert when kept upwards of two years. The rhizomes should be collected in summer, at which time they have a greenish colour, and a nauseous smell; and do not change when they are dried in the air. By an analysis of M. Morin it was found to contain a *fatty substance* of a nauseous odour and disagreeable taste, heavier than water; *gallic and acetic acids, uncrystallizable sugar, tannin, starch,* and a variety of *gelatine* insoluble in water and alcohol. He found that it also contained *subcarbonate, sulphate,* and *hydrochlorate of potassa, carbonate* and *phosphate of lime, alumina, silex,* and *oxide of iron.*[4] Geiger found a *green fat oil,* a *green resin, sugar, tannic acid, gum,* and *salts.*[5] M. Peschier of Geneva supposes that he has discovered the active principle of

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[1] Θηλυπτερις Dioscoridis.

[2] The characters of *Nephrodium* are, "Thecæ placed in the middle of a vein, forming roundish sori placed in rows. Indusium reniform."—*Lindley, Flora Med.* p. 69.

[3] Easily confounded with *A. filix fœmina,* which has short, erect rhizome, with black radical fibres.

[4] *Ann. de Chim.* xxvi. 219.

[5] *Handb. de Pharm.* 1829.

this root in the buds. He separates adipocire by treating the buds with sulphuric acid, until the adipocire forms as a mamillated substance, which he separates from the fluid by pressure. This fluid, by farther analysis, yields *brown resin,* a *volatile oil* which he affirms is the active principle, a *fixed oil, green colouring matter, extractive,* and some *salts.*[1] The internal part of the rhizome, and also the oil obtained from it, are used in medicine.

Medical properties and uses.—This root is astringent, and has been celebrated both by the ancients and the moderns as a powerful anthelmintic. It appears to have been used as such by Theophrastus, Dioscorides, and Galen; but although recommended by Hoffman, yet it was neglected by the moderns, until the publication of Madame Noufer's specific for the tape-worm by the French government again brought it into notice. According to her plan of administering it, from one to three drachms of the powdered root are to be taken in a large cupful of water, in the morning, while the patient is in bed; and, two hours afterwards, a strong cathartic of calomel and gamboge, proportioned to the age and strength of the patient, is to be given; and, if necessary, the further operation promoted by a dose of purging salts: nothing but broth being taken till the worm comes away. If this, however, did not happen on the same day, the process was ordered to be repeated on the next day.

M. Peschier says that 30 drops of the ethereal tincture of the oil will kill a tænia, and this quantity is contained in ʒ iij. of the powdered root, which should be taken on an empty stomach. This tincture is prepared by digesting ʒ j. of the buds in ℥ viij. of ether; alcohol may be used.

The oil of male fern has been recently used with success in some cases of tænia at University College Hospital.

ASTRAGALUS. *Spec. Plant. Willd.* iii. 1256.
Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. Ord.* Leguminosæ.
G. 1379. *Legume,* generally two-celled, gibbous.
Species. A. *verus.* True Astragalus. *Olivier, Voy. dans l'Empire Ottoman,* v. 342. *pl.* 44. A. *creticus.* *De Candolle's Astragologi.*
Officinal. TRAGACANTHA, *Lond. Edin. Dub.* Tragacanth. Gummy Exudation from Astragalus verus, *L. E.*; from Astragalus gummifer, *E. D.*; and from other species, *E.*

Syn. Gomme Adragant (*F.*), Traganth (*G.*), Dragant (*Swed.*), Gom Drangant (*Dutch*), Goma adraganti (*I.*), Gomo Tragacantho (*S.*), Alcatira (*Port.*), Samagh hulkatad (*Arab.*), Kuteera (*H.*), Vadomo cottay pisin (*Tam.*).

The shrubs, for they are probably of many species, which yield Tragacanth, are natives of the north of Persia; and there are yet just reasons for doubting whether the Astragalus *verus* is the only one. Indeed, Dr. Lindley states, on the authority of Mr. Brant,

[1] *Souberier, Nouv. Traité de Pharm.* 2d edit. ii. 159.

our consul at Ezeroum, that the best white tragacanth is yielded by A. *gummifer.* This plant is called Kurn in Persia, and flowers in July and August. It rises two or three feet only in height, on a stem about an inch in thickness; with many branches closely crowded together, and covered with imbricated scales and spines, formed from the petioles of the former year. The leaves, which scarcely exceed half an inch in length, are composed of six, seven, or eight pairs of opposite, villous, stiff, pointed leaflets; and the midrib is terminated with a sharp yellowish point. The flowers are small, yellow, and proceed from the axillæ of the leaves, with cottony bractes. The calyx is five-toothed, and shorter than the corolla, which is papilionaceous.[1]

The gum exudes in summer more or less copiously, according to the heat of the weather, in tortuous filaments, which are allowed to dry on the plant before being collected.[2] A large portion of the tragacanth collected in Persia is sent to India, Bagdad, Bussorah, and Russia: but what we receive is sent to Aleppo, Alexandretta, Smyrna, and Trieste; whence it is exported, packed in chests and casks. There are two varieties in the market, *flaky* or *Smyrna tragacanth,* and *vermiform* or *Morea tragacanth.*[3] There are also two qualities, namely, *sorts* and *picked tragacanth.*

Qualities.—Good gum tragacanth is inodorous, impressing a very slightly bitter taste as it softens in the mouth. It has a whitish or yellow colour; is semi-transparent, and in very thin, wrinkled, vermiform pieces: brittle, but not easily pulverized, except in frosty weather, or in a warmed mortar. Its sp. gr. is 1·384. It swells and softens in water, but does not form a homogeneous fluid mucilage, unless triturated after digestion in a large portion of water; but when the water is acidulated with any of the mineral acids, a small portion of it is dissolved. Bucholz[4] regards the soluble part as *Arabin* or common gum, which it much resembles: the insoluble called *Tragacanthin,* resembles *Basorin.* Tragacanth is wholly insoluble in alcohol and ether. The Arabin differs from that of acacia gum in being precipitated by the acetate of lead, sulphate of copper, nitrate of mercury, and chloride

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[1] Before Oliver suggested that the species of *Astragalus* above described yields the tragacanth of commerce, this gummy substance was supposed to be yielded by the A. *Tragacantha* of Linnæus, on the authority of Tournefort; or the A. *gummifera,* on that of M. de la Billardière. Perhaps all these species yield it, although the A. *verus* is that from which it is more generally procured. Sibthorpe affirms that the true tragacanth plant is the A. *aristatus,* which grows upon Mount Ida, where tragacanth is gathered in great abundance. The Kutteerah gum from India has been found not to answer the purposes of the ordinary tragacanth.

[2] De Candolle says, that the wood swells more than the bark, owing to its greater affinity for moisture than the bark; hence the latter cracks, and permits the gummy matter to escape; and doing so in a semi-fluid state, it assumes a flat tape form.

[3] *Martius,* quoted by *Pereira.*

[4] *Handb. de Chim.* ii. 779.

of tin; and not by silicated potassa [1], nor by the persulphate of iron. Tragacanth contains some starch, and is tinted blue by iodine.

Medical properties and uses.—Gum tragacanth is demulcent, and may answer the purposes of the acacia gum; being even better adapted for allaying tickling cough, and sheathing the fauces in catarrhal affection, owing to its greater viscidity. It is chiefly, however, employed for pharmaceutical purposes. The dose is grs. x. to ʒ j. or more.

Officinal preparations.—*Mucilago Tragacanthæ,* E. D. *Pulvis Tragacanthæ comp.* L. E.

ATROPA.[2] *Spec. Plant. Willd.* i. 1016.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

G. 381. *Cor.* bell-shaped. *Stam.* distant. *Berry* globular, two-celled.

Species 2. A. *Belladonna.* Deadly Nightshade, or Dwale. *Med. Bot.* *3d ed.* 230. *t.* 82. *Eng. Bot.* 592. *Smith, Flor. Brit.* 253. *Hayne,* i. 43.

Officinal. BELLADONNA, *Lond. Edin. Dub.* The leaf, fresh and dried, *L.*; the leaves, *E.*; the leaves and root, *D.*, of Atropa Belladonna. Deadly Nightshade, leaves and root. Dwale.

ATROPIA, *Lond.* An Alkaloid obtained from the root.

Syn. Belledame (*F.*), Tollkirsche (*G.*), Doodkruid, Dooddyke naghtschade (*Dutch*), Wargbär (*Swed.*), Natskade (*Dan.*), Belladonna (*I. S. Port.*), Psinki (*Pol.*), Krusavitsa (*Russ.*), Sug-unggor (*H.*), Robahturbuc (*Pers.*), Inubus saleb (*Arab.*).

Belladonna is an indigenous perennial, found in many parts of Great Britian, particularly in shady places where the soil is calcareous, flowering in June, and ripening its berries in September. The root is thick, fleshy, and creeping; sending up several erect, greenish, or slightly purple-coloured, herbaceous, somewhat downy, annual stems, about three feet in height, branching, leafy, round, and fleshy. The leaves are lateral, in pairs of unequal size, decurrent, on short petioles, ovate, acute, entire; of a dusky green colour above, and paler below; soft and fatty to the touch. The flowers are solitary, supported on axillary peduncles; drooping, and having a faint narcotic odour: the calyx is green, persistent, and deeply divided into five ovate segments: the corolla bell-shaped, of a lurid hue externally, and within dusky or brownish violet, with a yellow, variegated base, enclosing five filaments shorter than the corolla, nodding, and bearing large anthers: the ovary is pyramidal, supporting a simple style and two-lobed stigma. The ripe berry is large, seated within the calyx, roundish, with a longitudinal furrow, persistent, shining, smooth, and of a deep purple colour; containing many seeds, and a sweetish, violet-coloured juice.

Qualities.—The *root* of Belladonna is branching, fleshy, ex-

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[1] *Bostock, Nicholson's Journ.* lviii. 30.

[2] Named after Ἄτροπος, one of the Fates.

ternally brownish-grey, internally white: it has a faint odour and a sweetish-bitter taste. It should be taken up either in autumn or in early spring, before the stems begin to appear. The *leaves* of belladonna are inodorous: the taste is slightly nauseous, sweetish-bitter, and subacrid; they do not lose their active properties by drying, unless much heat be used. Vauquelin found that the expressed juice contains albumen, salts with a base of potassa, and a bitter principle, soluble in alcohol [2]; this was afterwards found by M. Brandes to be an alkaloid, which he named *Atropia,* and on which the narcotic quality of the plant depends; an opinion which was confirmed by M. Runge, Geiger, Hesse, and Mein, and is now fully established. The root yields the largest proportion of this principle, but it is also obtained from the seeds, and exists in the leaves. *Atropia,* when pure, occurs in the form of white transparent needles, which generally arrange themselves in stellate groups on crystallizing: it is without odour and has a strong acrid taste. At 194° F. it fuses into a transparent oily looking substance, and crystallizes again on cooling; it is partially volatile, without change, at 284° F.; at a higher temperature it burns with a white flame. It is soluble in about 300 parts of cold water, very soluble in alcohol, less so in ether; the solutions possess a strong alkaline reaction. Atropia neutralizes acids, and forms with them salts, some of which, as the sulphate, can be crystallized, but with difficulty. From the solutions of its salts, atropia is precipitated by chloride of gold, tannic acid, and astringent solutions.

It has been analyzed by Liebig and Von Planta, who assign to it the following formula, $C_{34}\ H_{23}\ N\ O_6$. The yellow precipitate produced by the gold solution (the double chloride of gold and atropia) has the formula $C_{34}\ H_{23}\ N\ O_6 + H\ Cl + Au\ Cl._3$

Besides atropia, which exists in the plant in the state of a supermalate (?), Brandes discovered two other substances, namely, *pseudotoxin,* an azotized principle of a gummy nature; and *phyteumacol,* of a similar nature.

Every part of the plant is poisonous; and children and the ignorant have often suffered from eating the berries, the beautiful appearance and sweet taste of which render them very alluring. The symptoms which they induce resemble those of intoxication, accompanied with fits of laughter and violent gestures [2]; great thirst, difficulty of deglutition, nausea, dilatation of the pupil, with the eyelids drawn down; redness and tumefaction of the face,

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[1] *Ann. de Chim.* lxxii. 53.

[2] Buchanan, the Scottish historian, states that the victory of Macbeth over the Danes was obtained chiefly by mixing this plant in a donation of wine and ale, which was sent by the Scots to Sweno during a truce. He describes very accurately the botanical characters of the plant; and adds, "vis fructui, radici, ac maxime semini somnifera, et quæ in amentiam, si largius sumantur, agat."—*Rerum Scot. Hist.* lib. vii. sect. 6.

stupor or delirium, a low and feeble pulse, paralysis of the extremities, convulsions, and death. Dissections show that the stomach and intestines have been inflamed; and after death the body swells; blood flows from the nose, mouth, and ears; and rapid decomposition ensues. The best mode of averting these fatal effects is by emptying the stomach with the stomach-pump, or emetics of sulphate of zinc or of copper, and assisting their operation by irritating the fauces: then evacuating the bowels by active purgatives and glysters; and following these by large doses of vinegar and other vegetable acids. The recovery is slow.

Medical properties and uses.—The deleterious effects we have enumerated demonstrate that Belladonna is a very powerful narcotic. It is, besides, anodyne and antispasmodic. When injudiciously or incautiously given, or when it is taken for a considerable length of time, even in small doses, it is apt to induce a dryness and stricture of the pharynx and adjoining parts of the œsophagus, sickness, vertigo, dilated pupils, and dimness of sight: symptoms sufficiently indicative of the necessity of suspending its use for some time, and giving it in smaller doses when it is resumed. The internal administration of belladonna appears to have been suggested by the advantages resulting from its external application. Lambergen, Cullen, De Haen, Junker, and others, found it very serviceable in the early stage of scirrhus and cancerous affections. Ritcher, Brera, Munch, Mayerne, and others, have asserted that it cures hydrophobia, but little confidence can be placed on this opinion. It has also been given with advantage in obstinate intermittents, chronic rheumatism, gout, paralysis, amaurosis, epilepsy, and pertussis; in the last of which diseases I can speak of its efficacy from my own experience. I usually prescribe it in minute doses, at short intervals, after inflammatory symptoms are subdued. Hufeland asserts that it has the power of allaying convulsions arising from scrofulous irritation; and its beneficial effects in neuralgia facialis, and other acute pains of a nervous origin, have been well ascertained.[1] Its narcotic powers are certainly great; but they have not been found sufficiently constant and permanent to insure its general use. Externally, used either as a fomentation, or the dried leaves powdered and sprinkled over the parts, it is of singular efficacy in diminishing the pain of cancerous and ill conditioned sores; and it obtunds the pain of hæmorrhoids. The *infusion,* when dropped into the eye, produces a great dilatation of the pupil, it was therefore proposed by Professor Reimarus for dilating the pupil previous to the extraction of the cataract; but the *extract* is commonly used in this country for the same purpose.[2] M. Dupuytren recommends belladonna internally in scrofulous

[1] *Observations on the Use of Belladonna,* &c. by John Bailey, 8vo. 1817.
[2] *Med. and Phys. Journ.* No. xxxii. Atropia itself is now often employed.

ophthalmia, and inflammation of the retina: but M. Runge[1] ascertained that this power is destroyed by alkaline solutions. "Its operation appears to be limited to the radiated fibres of the iris."[2] By continued use it loses its effect, but regains it after the application has been, for a short time, suspended. Hahnemann and Professor Koreff have stated that belladonna given during the prevalence of scarlatina has the power of protecting the individual who takes it from the infection. Dr. Randhahn, physician of the Orphan Hospital of Langendorf, in Prussia, confirmed this fact, by experiments on 160 children exposed to the contagion in the above-named hospital. But it has too often failed, in this country, to permit any confidence to be placed on its prophylactic powers against this disease. It appears to possess some efficacy in erysipelas.

Belladonna may be given in substance, beginning with one grain of the dry leaves powdered, and gradually increasing the dose until it displays its effects on the habit. An infusion made with one scruple of the dried leaves in ten fluid ounces of boling water is also used: two ounces may be given daily, and the dose cautiously increased; or it may be given in the form of the tincture.

From what has been stated regarding the effect of alkalies on belladonna, these bodies, and all astringent decoctions and infusions, are incompatible in formula with it.

Officinal preparations.—*Emplastrum Belladonnæ*, L. E. D. *Extract. Belladonnæ*, L. E. D. *Tinctura Belladonnæ*, L. D. *Unguentum Belladonnæ*, L.

ATROPIA, *Lond.* See *Atropa Belladonna* and *Atropiæ Sulphas*, Part III.

AURANTII CORTEX, FLORES, OLEUM, et SUCCUS. Vide *Citrus Aurantium.*

AURUM, *Lond.* APPENDIX. Gold.

This metal is found in many parts of the world, crystallized in the form of the cube or octohedrons; also in the form of masses or grains, or fibres, often associated with quartz, and sometimes with the ores of lead, copper, &c.

When pure, gold has a beautiful orange-yellow colour, heavy, its sp. gr. is 19·5, soft, malleable to an extreme degree, and very ductile. It is not acted on by air, water, heat, or by any acid; but free chlorine (such as is contained in nitro-hydrochloric acid), attacks and dissolves it.

The equivalent of gold is 98·33, or twice the quantity according to some chemists; and it is represented by the symbol Au.

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[1] *Ann. de Chim.* xxvii. 32.

[2] *Adam's Practical Observations on Ectropium*, &c. 8vo. p. 44.

Medical properties and uses.—Gold is introduced into the London Appendix for the purpose of detecting the presence of free chlorine, and not as a remedy. Various preparations of the metal have, however, been employed, especially abroad; such as the oxide, chloride, iodide, and double chloride of gold and sodium.

The action of the persalts of gold on the system appears to resemble very closely that of the persalts of mercury, one of the most convenient of the gold preparations for administration in the double chloride (*Sodii Auro-terchloridum*).

Externally, the gold salts may be used in obstinate skin affections, lupus, cancerous sores, in the form of an ointment or lotion.

Internally, they may be given in secondary syphilitic diseases and scrofula.

The doses of the salts of gold may be from $\frac{1}{20}$ gr. to $\frac{1}{10}$ gr., made into pills with starch, crumb of bread, &c.

AVENA. *Spec. Plant. Willd.* i. 443.

Cl. 3. *Ord.* 2. Triandria Digynia. *Nat. Ord.* Graminaceæ.

G. 142. *Calyx* two-valved, many flowered; with a twisted awn on the back.

Species 13. A. *sativa.*[1] Common Oat.

Officinal. AVENA, *Lond. Edin. Dub.* AVENA SATIVA. The seeds of the Oat decorticated, called Grits; and the seeds ground into meal.

Syn. Gruau d'avoine (*F.*), Habergrütze (*G.*), Gewoone haver (*Dutch*), Haver (*Dan.*), Hafregryn (*Swed.*), Orzo Avena (*I.*), Avena (*S.*), Avea (*Port.*), Oves obiknovennoi (*Russ.*).

The oat was found by Anson growing wild upon the island of Juan Fernandez, on the coast of Chili; but the place whence it was first brought to Europe has never been satisfactorily ascertained. It is an annual. The root is fibrous, pushing up a culm or straw, which rises above two feet in height. The inflorescence is a loose panicle, with the subdivisions on long pendulous peduncles. The glumes of the calyx are two, marked with lines, pointed, unequal, and larger than the flower. There are usually two flowers and seeds in each calyx: they are alternate, conical: the smaller one is awnless; the larger puts forth a strong, two-coloured, bent awn from the middle of the back of the glumule; both seeds are fertile.

There are many varieties of this species of grain cultivated in the north of Europe.[2] In this country, that which is called *the potato-oat* is considered the best; its grain is short and plump, with a thin, clean, bright, pale straw-coloured cuticle.

Oats, when freed from their cuticle only, are named grits, or groats; in which state, and ground into meal (*prepared groats*),

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[1] Βοῶμος Dioscoridis.

[2] In Scotland, some parts of England, a part of Siberia, and in the northern parts of Norway and Sweden, oats form the chief part of the vegetable nutriment of the inhabitants.

they are dietetically and medicinally used. In both states they yield their fecula to water by coction, and form a nutritious amylaceous gruel. The nutrient qualities of oats are well known. In many places the meal forms the chief support of the poor; and for infants who are unfortunately deprived of their natural and proper nourishment, the breast milk, no better substitute can be adopted than thin grit gruel, mixed with good cow's milk. The gruel should not be kept longer than forty-eight hours, as it is apt to become acescent after that period.[1]

Qualities.—Oats are inodorous; and taste very slightly, but not unpleasantly, bitter. Vogel, who analysed them, says they contain 66 per cent. of meal + 34 of husk. The former consists of 59 per cent. of *starch,* 10·75 of *saccharine mucilaginous extractive,* 4·3 of albumen, 2 oleaginous matter, and 24 of lignin. Dr. Christison procured from oatmeal 72·8 of *starch,* 5·8 *saccharo-mucilaginous extractive,* 3·2 *albumen,* 0·3 *oleo-resin,* 11·3 of lignin, and 6·8 of moisture.[2] They have not been chemically examined; but the greater part of their substance appears to consist of fecula or starch.

Medical properties and uses.—Gruels, or decoctions of grits or of oatmeal, are excellent demulcents, and therefore very frequently prescribed in inflammatory diseases, diarrhœa, cholera, dysentery, calculus, and febrile affections. They may be sweetened, acidified, or used plain. They are also used locally in glysters; and the meal boiled with water into a thick paste forms an excellent suppurative poultice.

AXUNGIA. See *Sus Scrofa.*

BALSAMODENDRON. *Fée, Cours d'Histoire Nat. Pharm. t.* 1. p. 641.

Cl. Octandria. *Ord.* Monogynia, *Linn.* *Nat. Ord.* Burseraceæ, or Amyridaceæ.

Species. B. *Myrrha.* *Nees von Esenbeck,* 357.

Officinal. MYRRHA.[3] *Lond. Edin. Dub.* Myrrh, a gum-resin.

Syn. Myrrhe (*F.*), Myrrhen (*G.*), Mirra (*I.*), Mirra (*S.*), Myrrha (*Port.*), Mire (*Dutch*), Myrra (*Swed.*), Mirra (*Russ.*), Murr (*Arab.*), Ból (*H.*), Heera bol (*Duk.*), Vóla (*San*), Valatipolum (*Tam.*), Manisan lebah (*Malay*), Madu (*Jav.*), Palendra bolum (*Tam.*).

The tree or plant which produces this gum-resin is a native of the borders of Arabia Felix, in the province of Gison. It remained

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[1] The following is the simplest mode of making gruel:—Put three ounces of grits which have been washed into four pints of water, and boil slowly until the water be reduced one half; then strain through a sieve, to separate the undissolved part of the grits from the gruel.

[2] *Christison's Dispensatory.*

[3] Σμυρνα Dioscoridis. The name Μυῤῥα, used by Hippocrates, is derived from μυρον, an ointment. Professor Verey (*Journ. de Pharm.* 1820) derives it from the Phœnician word *mor* or *mur.* Myrrha, the daughter of Cinyras, king of Phœnicia, was metamorphosed into a tree, for being criminally in love with her father.

long undescribed by naturalists; and the conjectures of Mr. Bruce in favour of its being a mimosa, were by no means satisfactory.[1] At length, however, it has been described by Nees von Essenbeck, on the authority of Ehrenberg, who has seen the myrrh collected from the bark. It is a small tree with a stunted trunk, with whitish grey bark, and rough abortive branches with spines. The leaves are ternate, the leaflets obovate, blunt, obtusely toothed. The fruit is oval, longitudinally furrowed, of a brown colour, and surrounded at the base by the persistent calyx. The juice exudes spontaneously, and concretes upon the bark.[2] It exudes at first oily, then thickens, and from a yellowish white colour gradually assumes a golden hue, and becomes red when dry. It is imported in chests, each containing from one to two hundred weight. Two kinds are found in the market, namely, the *Abyssinian myrrh*, which comes to us through the East Indies, from Bombay, in chests, and *Turkey myrrh*, a small quantity produced in Arabia, which is brought by the way of Turkey. The former constitutes the chief importation of myrrh, and consists of all qualities, or, as the term is, "in sorts."

Qualities. — Myrrh has a peculiar, rather fragrant odour, augmented when it is powdered or heated, and a bitter, aromatic taste. It softens in the mouth, and adheres to the teeth when chewed.

Turkey myrrh is in various-sized irregularly shaped pieces, which can scarcely be called tears: they are translucent, of a reddish-yellow colour, brittle, breaking with a dull resinous fracture, and easily pulverized. It does not melt when heated, and is not very inflammable. Its specific gravity is 1·360.[3]

East Indian or *Abyssinian myrrh* is often opaque; the best is in tears of a small size, varying in colour from whitish yellow to reddish yellow, or even brown. It is often mixed with many impurities[4], consisting of gum and fragments of mastiche. There is an inferior kind of a dark colour, approaching nearly to black, with a disagreeable odour, which should be rejected. It appears to be the production of old trees.

Myrrh is partially soluble in water, alcohol, and ether. In distillation with water, it yields a volatile oil heavier than that fluid. When it is triturated with very soft or distilled water, nearly the whole appears to be dissolved, forming an opaque, yellowish solution; but a great part is deposited by rest, and not more than one half of the gum-resin is actually dissolved. The alcoholic tincture is rendered milky and opaque when mixed with water, but no precipitate appears. Braconnot asserts that 100 parts of myrrh

[1] *Phil. Trans.* lxv. 413.

[2] *Fée, Cours d'Hist. Nat. Pharm.* 1. p. 641.

[3] *Ann. de Chim.* lxviii. 52.

[4] These are sometimes salt; and as salt is a production of the soil in Abyssinia, this is readily accounted for by the myrrh dropping on the ground.

consist of 2·5 of volatile oil, 23 of resin, and 58 of gum, soluble and insoluble, and 16·5 of loss; but my experiments lead to a somewhat different conclusion, and accord more with those of Pelletier, who found the proportions to be 34·68 of resin and 65·32 of gum. Myrrh has been more accurately analysed by Brandes, who found 2·60 of volatile oil, 22·24 of soft resin, 5·56 hard resin, 54·38 soluble gum, 7·32 insoluble gum, 1·36 salts, and 4·54 impurities = 100.[1] Ether, digested on powdered myrrh, dissolves three parts in eight; and the tincture, evaporated on water, deposits two grains and a half of very *bitter resin*, and half a grain of *extractive matter*, which also tastes bitter. The part insoluble in the ether is nearly all soluble in water, and affords a solution resembling that of *acacia gum;* but differing from it in being precipitated by solutions of protochloride of tin, bichloride of mercury, and of acetate of lead; hence approaching to the nature of *extractive.* Myrrh triturated with crystallized carbonate of alkalies is reduced to the form of a tenacious fluid. Entire myrrh treated with nitric acid yields oxalic acid. Myrrh consists chiefly of *resin, essential oil, extractive,* and *gum.* The volatile oil is heavier than water; nearly colourless, and has the odour of the myrrh. It dissolves in ether, alcohol, and the fixed oils, and is reddened by the mineral acids. The hard resin has acid properties, and forms compounds with bases.

Medical properties and uses. — Myrrh is tonic and expectorant. In moderate doses it stimulates the stomach, promoting the appetite and digestion; but, in larger doses, it increases the frequency of the pulse and augments the general heat of the body.[2]

As a tonic, myrrh is efficaciously given in cases of debility[3]; such as accompany amenorrhœa, chlorosis, and convalescences; and in chronic bronchitis, and in the latter stages of phthisis pulmonalis, when the inflammatory symptoms and hectic fever do not run high. Its use in phthisis has, indeed, been condemned by several physicians of great repute[4]; but when there is an evident ulceration of the lungs without much hectic, and the patient's strength is considerably reduced by the quantity of the expectorated purulent matter, the proper exhibition of myrrh may be certainly productive of benefit. In the first-mentioned diseases, it is advantageously combined with aloes, cinchona, or other bitters and chalybeates; and in phthisis, with nitre, opium, camphor, and the sulphate of iron or of zinc. Combined with oxide of zinc, it has been found extremely useful in the peculiar cough which sometimes accom-

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[1] *Berlinisches Jahrbuch*, xxii. p. 275.
[2] Cullen, *Mat. Med.* ii. 123.
[3] It was formerly used for the cure of quartans; ʒj. in a glass of warm Cretan wine being given an hour before the paroxysm, and thrice repeated before the accession. Mathiolus, cap. 67., says, "Hoc medicamento ego ipse curatus sum."
[4] *Cullen. Fothergill.*

panies pregnancy, and continues after abortion. As an expectorant, it is often employed in humoral asthma and chronic bronchitis; and with the same view it has been given in phthisical affections: but it cannot be employed with propriety in pulmonary cases, where there is much inflammatory action; and any advantage derived from its use in phthisis, probably depends altogether on its tonic operation counteracting the exhaustion, which is produced by a copious purulent expectoration.

Myrrh exerts a topical astringent and excitant action on the tissues to which it is applied. As a local stimulant, the alcoholic solution, diffused in water, is used as a lotion in a spongy state of the gums, and for correcting the fœtid discharge of vitiated ulcers, particularly when connected with caries of the bone; and as a gargle in cynanche maligna. In foul flabby ulcers it promotes cicatrization, when sprinkled on them.

Myrrh is administered in substance, or in the form of watery solution, or of tincture properly diluted. The watery solution is much less stimulant than any of the other preparations, and is now rarely ordered. A watery extract is ordered in some foreign pharmacopœias, and preferred by many physicians, from an idea that it is less heating than the gum-resin; but it is equally bitter, and is perhaps not different from a diminished dose of the myrrh. The dose of myrrh in powder is gr. x. to ʒ ss.

Officinal preparations.—*Tinctura Myrrhæ*, L. E. D. *Tinctura Aloes et Myrrhæ*, E. *Pilula Aloes cum Myrrhâ*, L. E. D. It is contained in several other officinal preparations.

BALSAMUM CANADENSE. See *Pinus*.

BALSAMUM PERUVIANUM. Vide *Myroxylum*.

BALSAMUM TOLUTANUM. Vide *Myroxylum*.

BAROSMA. See *Diosma*.

BARYTA. Baryta.

Syn. Baryte (*F.*), Baryterde, Schwerede (*G.*), Barite (*I.*).

This mineral substance does not exist, as far as we know, in an uncombined state; and its native combinations hitherto discovered are very few. It is obtained native.

A. combined with carbonic acid:

Sp. 1. *Carbonate of Baryta*, or *Witherite*.[1]

B. Combined with sulphuric acid:

2. *Sulphate of Baryta*, or *Heavy spar*.

Baryta is obtained by decomposing these fossils. It is not a simple substance, but a compound of a peculiar metallic base,

[1] So named by Werner, after Dr. Withering, who discovered it native on Alston Moor, in Cumberland, in 1783.

named *barium* by Sir H. Davy, its discoverer, and *oxygen*, in equivalent proportions. Baryta was known long before its nature was detected, having been discovered by Scheele, in 1774. It is readily procured by decomposing nitrate of baryta in a red heat. It is a heavy grey powder, with an alkaline reaction; a sp. gr. 4; and acting on water like lime. It attracts carbonic acid from the air, and becomes a carbonate. It also attracts water, and forms a hydrate. The equivalent of barium is 68·64.

1. CARBONATE OF BARYTA.

Officinal. BARYTÆ CARBONAS, *Edin. Dub.* Carbonate of Baryta.

Syn. Spath pésant, Carbonate de Baryte (*F.*), Schwerspath, Kohlensaurer Baryt (*G.*), Ossicarbonato di Barite (*I.*).

This fossil is found native in Sweden, Scotland, and Cumberland; but in greatest abundance at Anglesark, in Lancashire. It usually occurs massive in veins, which traverse the independent coal formation: and sometimes, though rarely, it is found crystallized.[1] It is well known under the name of *Witherite.* It is found massive, in stalactites, and in crystals, which are small, and their primitive form undecided. Its sp. gr. is 4·3.

Qualities. — Carbonate of baryta is inodorous and insipid, but it is nevertheless poisonous. Its colour is white, or yellowish grey: it is translucent, with a shining, somewhat resinous lustre; and breaks in one direction with a fracture intermediate between radiated and foliated, and in another uneven: the fragments are wedge-shaped. The lustre of the principal fracture is glimmering, that of the cross glimmering and resinous. When heated it becomes opaque, and is fused into a white enamel by the blowpipe; and, when pulverised, its powder phosphoresces when thrown on burning coals. It is nearly insoluble, requiring for its solution 4304 times its weight of cold water, and 2304 of boiling water. It dissolves with effervescence in diluted hydrochloric and in diluted nitric acid, although the strong acids exert little or no action on it. It is not precipitated from these solutions by pure liquor ammoniæ; but the whole of the baryta falls as a sulphate, when sulphuric acid is added in excess. The purity of the carbonate is ascertained by its complete solubility in dilute nitric acid; and by the whole of the baryta being thrown down as a sulphate when sulphate of magnesia is added to the acid solution. Carbonate of baryta consists of 76·8 of baryta + 22·12 of carbonic acid = 100: or 1 eq. baryta + 1 carbonic acid.

Use. — It is only used for preparing the chloride. It may, however, be employed as a poison: it produces slight inflammation of

[1] At Alston Moor, Cumberland, it is combined with carbonate of lime.

the stomach; but it acts chiefly on the brain, spine, and voluntary muscles.[1] The antidote is diluted sulphuric acid, and the sulphates; as the sulphate of baryta which is thus formed is an inert salt.

Carbonate of baryta is used in the preparation of several of the other salts of barium.

2. SULPHATE OF BARYTA.

Officinal.—SULPHAS BARYTÆ, *Edin. Dub.* Sulphate of Baryta.

Syn. Sulfate de Baryte (*F.*), Schwefelsaurer Baryt (*G.*), Tungspat (*Swed.*), Ossisolfato di Barite (*I.*), Tunspat (*Dan.*).

This combination of baryta, which was formerly named *Ponderous spar*, is found native at Freyburg in Germany, in Scotland, Cumberland, Westmoreland, and in many parts of the world. It is found almost always in veins, but sometimes it occurs in beds. It is occasionally obtained in powder, frequently in amorphous masses, and often in crystals.

Qualities.—Sulphate of baryta is inodorous and insipid. Its colour is white, with shades of yellow, red, blue, or brown. It occurs transparent, semi-transparent, or only translucent; and is hard, brittle, and heavy, its specific gravity being from 4·448 to 4·67. The varieties of form of its crystals are numerous; but the primitive form is a right rhombic prism, the bases of which are rhombs with angles of 101° 30′ and 78° 30′.[2] The most common varieties of its crystals are the octahedron with oblique summits, the six or four-sided prism, the hexangular table with bevelled edges; sometimes they are needle-form.[3] It breaks with a straight foliated fracture; the fragments are nearly rhomboidal, and have a shining, pearly, almost vitreous lustre. It decrepitates, and is fused before the blow-pipe, and converted into the sulphuret; and is soluble in sulphuric acid only, from which it is precipitated by water. It consists, according to Berzelius, of 65·643 of baryta + 34·357 of acid = 100·000. Formula $Ba\ O,\ So_3$.

Use.—This barytic salt is unnecessarily introduced into the list of Materia Medica of the Edinburgh and the Dublin Colleges. It is merely used as a substitute for preparing the chloride of barium, when the carbonate cannot be procured.

BARII CHLORIDUM, *Lond.* APPENDIX, *Crystals.* See Preparations.

BEBEERINE or BIBIRINE. See *Nectandra Rodiei.*

BELLADONNA. See *Atropa Belladonna.*

BENZOINUM. See *Styrax.*

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[1] Professor Gmelin found that, in animals poisoned by the soluble salts of baryta, the voluntary muscles lose their contractility; but the heart continues to contract for many minutes, even without the application of stimuli.—*Versuche über die Wirkungen*, &c. 1824.

[2] *Haüy, Thomson's Chemistry*, vol. iv. p. 369.

[3] *Thomson's Chemistry*, 5th edit. vol. iii. p. 413.

BERGAMII OLEUM. See *Citrus.*
BISTORTÆ RADIX. See *Polygonum Bistorta.*

BISMUTHUM. Bismuth. *Lond. Edin. Dub.*

Syn. Etain gris, Etain de glace, Bismuth (*F.*), Reiner Wismuth (*G.*), Bismuto puro (*I.*), Wismut (*Swed.*), Vismut (*Dan. Russ.*).

This metal is not very widely diffused. Its ores are found chiefly in Saxony; and, less abundantly, in Sweden, France, Bohemia, and Cornwall. It is usually accompanied by cobalt. It most commonly occurs in the state of metal, and, therefore, its ores are not much diversified. The following are the states in which bismuth is found:—

A. In its metallic state:

i. Alloys.	*Sp.* 1. *Native Bismuth.*

B. United with other metals and sulphur:

ii. Sulphurets.	2. *Common Sulphuret.* 3. *Needle Ore.* 4. *Cuprous Sulphuret.*

C. United with oxygen:

iii. Oxide.	5. *Bismuth Ochre.*

The ancient German miners regarded it as incomplete silver, or silver beginning to form, and termed it *tectum argenti;* and so late as the close of the 17th century it was considered a species of lead. It was first noticed by Agricola in 1529.

Bismuth was for some time, also, considered as an alloy by chemists; but this opinion was gradually discovered to be erroneous, and it now ranks as a distinct metal.[1]

Bismuth appears as if formed of broad shining plates adhering to one another, of a reddish-white colour: it is both insipid and inodorous. Its specific gravity is 9·82 to 9·88. It is brittle, and is rather softer than copper, but is not very malleable: it breaks when struck smartly by a hammer, and is pulverizable: it soon loses its lustre when exposed to the air, but it remains unaltered under water. It cannot be drawn out into wire. It melts at 476° Fahr., in which state its surface is oxidized in pellicles like lead: it evaporates in a higher temperature, and may be distilled over in close vessels. It is inflammable in a strong red heat, burning with a faint blue flame, and emitting a yellow smoke, which condenses into an oxide, insipid, insoluble in water. The oxide when strongly heated melts, and may be sublimed at a heat below that which is required to fuse it. It is easily reduced when heated in conjunction with combustible bodies, the affinity between

[1] The Greeks and Arabians were not aware of the existence of bismuth; but it was very early distinguished by the Germans. It is mentioned as a peculiar metal by Agricola, in his treatise entitled *Bermannus*, written in 1529.

bismuth and oxygen being weak. According to Lagerhjelm this oxide consists of 100 parts of bismuth and 11·275 of oxygen; or, according to Mr. Phillips, of bismuth 90 and oxygen 10 in 100 parts.[1] Bismuth is sometimes mixed with copper or iron, both of which may be detected by treating the bismuth with diluted nitric acid, and precipitating with ammonia, which colours the supernatant fluid blue if copper be present, and forms a yellowish precipitate if the bismuth contains iron.

Bismuth inflames in chlorine gas, and forms a chloride. It also combines readily with iodine when heated, and forms an iodide of an orange-yellow colour, and soluble in pure potassa. Bismuth does not combine with nitrogen, hydrogen, carbon, boron, silicon, or phosphorus. In fusion, it readily combines with sulphur, and forms a sulphuret of a bluish grey colour, which is not unlike sulphuret of antimony. It crystallizes in tetrahedral crystals, that cross one another, and is very brittle and fusible. Its constituents, according to Dr. John Davy, are 100 of bismuth and 22·34 of sulphur, which nearly agrees with the analysis of Lagerhjelm, who makes them to be 100 of bismuth and 22·52 of sulphur.[2] Bismuth is readily alloyed with other metals, forming with several of them compound metals of great fusibility.[3] It is dissolved by nitric acid, and by boiling sulphuric acid. The equivalent of bismuth is 70·95; or, considering the salt usually called the trisnitrate or subnitrate as a pronitrate, the equivalent is 212·85.

Bismuth in its metallic state has no action on the animal economy. It is used merely for preparing the *trisnitrate* or *nitrate;* a salt which has long been employed, with great advantage, in cardialgia and similar affections of the stomach.

BISMUTHI NITRAS or TRISNITRAS. See Part III.

BITUMEN.

Syn. Bitume (*F.*), Erdharze (*G.*), Bitume (*I.*), Bitumen (*S.*).

In the limited signification of this term, it is meant to imply those mineral inflammable bodies which resemble, in a certain degree, oily and resinous substances. They have been divided into two classes: the first containing bitumens, or, properly speaking, *bituminous oils*, which possess nearly the same properties as the volatile oils; the second, *bitumens* strictly so called, which possess properties peculiar to themselves[4]; and a third class may be formed of those substances in which bitumen predominates with other components.

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[1] *Translation of the London Pharmacopœia*, 1824, p. 91.

[2] *Thomson's Chemistry*, 5th edit. vol. i. p. 459.

[3] An alloy composed of 8 parts of bismuth, 5 of lead, and 3 of tin, will melt in water below the temperature of 212°; and is rather useful for taking casts and similar purposes.

[4] *Thomson's Chemistry*, 5th edit. vol. ii. p. 384.

A. Bituminous oils:

fluid.	*Sp.* 1.	Petroleum. Var. *a. Naphtha.* *b. Petroleum.*
solid.	2.	Maltha, or sea wax.
	3.	Mineral tallow.

B. Proper bitumens:

solid.	*Sp.* 1.	Asphaltum.
semifluid.	2.	Mineral tar, or tallow.
solid.	3.	Mineral caoutchouc.

C. Bituminous compounds:

1. *with resinous matter.*	*Sp.* 1.	Resin-asphaltum.
2. *with charcoal.*	2.	Pit-coal. Var. *a. Brown coal.* *b. Black coal.* *c. Glance coal.*

According to Hatchett, the elements of bitumens are carbon, hydrogen, sometimes nitrogen, and probably oxygen.[1]

Officinal. PETROLEUM, *Lond. Edin.* Petroleum. Barbadoes Tar.

Syn. Petrole (*F.*) Steinöhl (*G.*), Bergolja (*Swed.*), Sternalie (*Dan.*), Petrolio (*I.*)' Petroleo (*S.*), Neft (*Arab.*), Mitti tel (*H.*), Munt ylum (*Tam.*), Minnia tanna (*Malay*), Ippoo (*Sum.*), Kesosonoabra (*Jap.*).

Bitumen is found at Ormskirk in Lancashire, Colebrook Dale, and near Edinburgh. It is also found in Languedoc, and in many other parts of the world, in various states of purity. When free from foreign ingredients, and before it has been long exposed to the action of the air, it is named *naphtha:* of which the purest kind that is brought to Europe comes from Monte Ciaro, near Piacenza, in Italy. "This hill consists of horizontal beds of argillite, in which pits are sunk till water flows into them; after which the naphtha oozes out of the sides and floats on the surface of the water, whence it is skimmed off every week."[2] It usually flows from rocks of the coal formation.[3] There is also a fountain of very pure naphtha at the base of the mountains of Bucktiavi, between the city of Bruster and the valley of Ramhovmouz. The less pure petroleum of the shops is procured from Monte Festino, near Modena. In the Birman empire there are 520 wells in one district, which yield annually more than 400,000 hogsheads of petroleum.

Qualities.—Naphtha is colourless, or of a pale yellowish colour, thin, fluid, light, transparent, odoriferous, unctuous to the touch, volatile, and very inflammable. By long exposure to the air it passes into the second variety, *petroleum;* which is thicker than naphtha, unctuous to the feel, semi-transparent, of a reddish or blackish brown colour, and when long exposed to the air changes

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[1] *Linn. Trans.* iv. 129.

[2] *Mem. Sci.* 1736, p. 57.; quoted by Aikin, *Dict. of Chem.* art. *Bitumen.*

[3] In Zante there are several pitch springs, which were as productive 2300 years ago as they are now.

into true *bitumen*. Petroleum has a strong, penetrating, not disagreeable odour, and a bitter, pungent, acrid taste; and is not quite so inflammable as naphtha. The sp. gr. of naphtha is 0·753 to 0·847; that of petroleum varies from 0·730 to 0·878.[1] It boils at 176° to 212.° These substances appear to be very complex and varying in composition, consisting of different hydrocarburets: some yield parrafin ($C_{20}\ H_{21}$) and eupione ($C_5\ H_6$), products of the distillation of tar. Both are insoluble in water, but soluble in alcohol, ether, the volatile and the fixed oils. When distilled with water, petroleum comes over nearly as clear and fluid as naphtha. Both these varieties of bitumens combine with fat, resins, volatile oil, and camphor: with alkalies they form soapy compounds; sulphuric and nitric acids change them into solid resins. Pure naphtha, from not containing oxygen, is used to preserve very oxidizable metals, as potassium, sodium, &c.

Medical properties and uses.—Petroleum is a stimulating antispasmodic and sudorific; and as such has been given in asthma and coughs unattended with inflammation; and in Germany it has been extolled as a specific for tape-worm; but it is chiefly used externally as a stimulant in diseases of the hip-joint, in rheumatic and other chronic pains, in chilblains, porrigo, and to paralytic limbs, applied by friction.[2] It is, however, scarcely ever employed; and on this account is not often to be procured in the shops. The dose of petroleum may be from ♏ x. to f ʒ ss. given in any convenient vehicle.

BORAX. See *Sodæ Biboras.*

BOSWELLIA. *Roxburgh.*

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Amyridaceæ, *Lind.*

Gen. Char. *Flowers* bisexual. *Cal.* five-toothed, small. *Cor.* five petals, obovate-oblong, very patent, seated under margin of the disk. *Stam.* alternately shorter; anthers caducous. *Ovary* oblong; style caducous, stigma capitate. *Torus*, a crenulated fleshy cap, surrounding the lower part of the germ, persistent. *Fruit* capsular, three-sided, three-valved, three-celled. *Seeds* solitary, membranous, winged.

Species. B. *thurifera.* *Asiatic Researches*, 8vo. vol. ix. p. 317.

OLIBANUM[3], Olibanum. Not now officinal in the British Pharmacopœias.

Syn. Encens Oliban (*F.*), Weihrauch (*G.*), Olibano (*I.*), Incienso fino (*S.*), Wirach (*Swed.*), Ladon (*Russ.*), Paringhi Sambrani (*Tam.*), Looban (*Malay*), Koondir Zuckir (*Hind.*), Cundur (*Arab.*), Labúniyá (*Syr.*).

Olibanum was supposed, on the authority of Linnæus, to be the production of the Juniperus *Lycia*[4]; but this opinion appears to

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[1] *Kirwan.*

[2] In the West Indies the Barbadoes tar is used as an internal remedy. Of the Burmese petroleum, Dr. Fleming remarks, "In chronic rheumatism I found much greater benefit from it than from the more costly cajeput oil."—*Asiatic Researches.*

[3] Quasi Oleum Libani. *Colebrook, Asiatic Researches*, 8vo. vol. ix. p. 382.

[4] *Λιβανος* Dioscoridis.

be erroneous; for, as Mr. Colebrook has observed, "this species of juniper is a native of the south of France;" and the French botanists deny that it yields the resinous gum in question.[1] On this account, therefore, and influenced by other proofs brought forward by Mr. Colebrook, the London College, in 1836, was induced to regard olibanum, at least that brought from India, as the production of the Boswellia *serrata* of Roxburg, the B. *thurifera* of Colebrook.[2] Lamarck supposes that the Arabian olibanum is the production of the Amyris *Gileadensis;* but his reasons are not very conclusive.

The Boswellia serrata is a native of the mountains of India, and is vulgarly known under the name of Sálaï. It is a large tree, with the foliage crowded at the extremities of the branches. The leaves are deciduous, impari-pinnate, exstipulate, consisting of ten pairs of leaflets, sessile, each an inch or an inch and a half in length, obliquely ovate, oblong, obtuse, serrated and villous, supported by round downy petioles. The flowers, which are produced in terminal and axillary racemes, shorter than the leaves, are numerous, small, and of a pale pink colour, accompanied with minute bracteas. The calyx is persistent, monophyllous, five-toothed, and downy: the corolla composed of five oblong, spreading, exteriorly downy petals; and the torus a fleshy, crenulate, coloured cup. The stamens are ten, alternately shorter, supporting oblong anthers: the pistillum consisting of an ovate germen, a cylindrical deciduous style, and trilobate stigma. The fruit is a capsule, smooth, three-sided, trilocular, three-celled, and three-valved; each cell containing one seed only, which is broad, cordate, and winged.

Olibanum is imported in chests and casks from Bombay, and is sold at the East India Company's sales; but the Indian olibanum is not so much esteemed as a kind which is brought from the Levant.

Qualities.—Olibanum is a translucent, whitish-yellow, brittle substance, generally covered with whitish powder produced by the friction of the pieces against each other. Its odour, when burnt, is fragrant; its taste is acrid, bitterish, and somewhat aromatic. When heated, although it melts with difficulty, yet it burns brilliantly, and leaves a whitish ash, composed of phosphate, carbonate, and sulphate of lime, with carbonate of potassa and chloride of potassium. When distilled alone, it affords a volatile oil; but when in conjunction with water or alcohol, no oil comes over. Alcohol dissolves three fourths of it, forming a transparent solution; and when triturated with water, a milky solution is produced, from which, after some time, the resinous matter is deposited

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[1] *Asiatic Researches*, vol. ix. p. 377.

[2] Although so much used in the early ages as incense in sacrifices, and, latterly, in the ceremonies of the Greek and Roman churches, yet both ancient and modern writers have differed regarding the plant yielding it.

and three eighths only remain dissolved. Ether takes up rather more than one half, and, when evaporated on water, leaves a very pure transparent resin; while the part undissolved by it becomes white and opaque, and is almost entirely soluble in water, forming a milky solution. Hence olibanum appears to consist of *resin, gum,* and a *volatile oil.* This opinion has been confirmed by Braconnot, who analysed olibanum, and found, in 100 parts of it, 8 of *fragrant volatile oil,* 56 of *resin,* 30 of *gum,* and 5·2 of a *matter resembling gum,* but insoluble in water and alcohol.[1] The oil resembled the oil of lemons in colour, with a terebinthinate odour. It is a compound of $C_{35} H_{28} O$. According to Mr. Johnston its resin is of two kinds: one acid, the formula of which is $C_{40} H_{32} O_6$; and one which is not acid, but resembles colophony, its formula being $C_{40} H_{32} O_4$.[2]

Dr. O'Shaughnessy found in a fine specimen of olibanum as much as 28 parts of volatile oil in the 100 parts.

Medical properties and uses.—Olibanum is stimulant and diaphoretic. It was formerly much used in gleets and affections of the chest, and, externally, as a vulnerary; but it is now employed only as a perfume in sick rooms.

BRAYERA ANTHELMINTICA. See *Kousso.*

BROMINEUM.[3] Not now officinal.

Syn. Brome (*F.*), Brom (*G.*), Bromo (*I.*), Brom (*Russ.*).

This substance exists in sea water in the form of bromide of sodium and of magnesium, and may be obtained from the bittern remaining after the chloride of sodium has been separated. It usually exists, also, in the brine springs both of Europe and America, although that of Droitwich is said to contain none of it. It has likewise been procured from kelp; and Balard has detected it in the ashes of the Janthina violacea, a molluscous animal. It is also a component of sponge. Bromine is extracted from bittern by adding chlorine to it and distilling; red vapours of bromine rise, and are condensed in a receiver kept cool with ice; but Balard's method is to transmit a stream of chlorine through the bittern, and then to agitate the liquid with ether: this dissolves out the whole of the bromine, and it is separated with the ether, which rises to the surface of the solution. The ethereal tincture is next to be agitated with pure potassa, which forms a colourless solution of bromide of potassium and bromate of potassa. This solution, evaporated to dryness and ignited, is lastly distilled in a retort with binoxide of manganese and slightly diluted sulphuric acid.

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[1] *Ann. de Chim.* lxviii. 60.

[2] *Phil. Trans.* 1839.

[3] From Βρωμος, *fœtor,* significant of its rank odour.

The bromine comes over in vapour, and is condensed in a receiver kept very cold.

Bromine is a dark reddish brown, very volatile liquid, with a disagreeable, suffocating odour, somewhat resembling chlorine, and a hot acrid taste, sp. gr. 2·966. It emits reddish vapours, boils at 116·5° Fahr., and at 10° becomes solid and brittle. Water dissolves it sparingly; alcohol and ether abundantly: it corrodes organic substances, and is fatal to animal life. In its chemical properties it closely resembles chlorine. It gives a yellow precipitate with starch; with hydrogen and with oxygen it forms acids. Its affinity for the metals is great; some, as antimony, burning spontaneously in it. Its equivalent is 78·26.

Bromide of Potassium, contained in the London Pharmacopœia of 1836, but now omitted. Can be prepared in the same way as the iodide, using bromine in place of iodine.

It occurs in cubical crystals, white and inodorous, which decrepitate when heated, and fuse but are not decomposed at a red heat. The salt contains potassium and bromine in single equivalents.

Formula (K. Br.) It is anhydrous. The bromine can be discovered by the addition of chlorine water, or a strong acid, causing the solution to give a yellow precipitate with starch.

Medical properties and uses. — Bromine operates as a violent poison, and is very seldom employed in a free state; yet in combination with iron and potassium it has been found useful in the same cases as the iodides of these metals.

BUCKU. See *Diosma.*

CAJUPUTI OLEUM. See *Melaleuca minor.*

CALAMI RADIX. See *Acorus Calamus.*

CALAMINA. See *Zincum.*

CALCII CHLORIDUM, *Lond.* See Part III.

CALUMBÆ RADIX. See *Cocculus palmatus.*

CALX, *Lond. Dub.* Lime, (recently burnt, *D.*).

Syn. Chaux (*F.*), Kalk (*G.*), Calce (*I.*), Ongeblusche kalk (*Dutch*), Calviva (*S. Port.*), Brand kalk (*Swed.*), Kalk (*Dan.*), Genaia izvest (*Russ.*), Chunāmboo (*Tam.*), Hoonoo (*Cing.*), Soonum (*Tel.*), Capoor (*Malay*), Nooreh (*Pers.*), Chunna (*H.*), Ahúck (*A.*), Kakote-tung-ŏ-ă (*Esquimaux*).

This earth, which is an oxide of a metal, *Calcium,* is very rarely found in an uncombined state[1]; but very abundantly in combination with carbonic acid and other substances. It forms a part of the bodies of animals and of almost all vegetables; exists in the waters of most rivers and of the ocean; and is a principal constituent of many fossils, soils, and mountains. The following species only

[1] Monnet affirms that it exists in the mountains of Upper Auvergne, mixed, however, with a little oxide of iron. — *Monnet's Mineralogy,* p. 515.

of the fossils in which it is found in combination with carbonic acid require to be noticed:—

Sp. 1. *Chalk.*		
2. *Limestone.*	Subsp. 1.	*Compact Limestone.* *Var. a.* Common. *b.* Roe-stone.
3. *Foliated limestone.*		*Var. a.* Granular foliated, or statuary marble. *b.* Calcareous spar.
4. *Fibrous limestone.*		*Var. a.* Common fibrous, or satin spar. *b.* Calcsinter, or Stalactite.
5. *Pea stone.*		

By exposing any of these carbonates to a strong heat the carbonic acid is driven off, and *lime*, or *quicklime*, as it is commonly called, is obtained; not, however, perfectly pure, but containing generally portions of silex, argil, or magnesia. To obtain very pure lime, let white marble be dissolved by dilute hydrochloric acid, leaving an excess of marble undissolved. A solution of pure ammonia being added to the solution of marble will indicate by a precipitate the presence of argil and magnesia, which are to be separated by filtration, and the lime itself precipitated in the form of carbonate by a solution of pure carbonate of potassa. This precipitate, after it is washed with water and dried, and exposed to a very violent heat in a platinum crucible, is pure lime.[1] It is a white, sonorous, brittle substance, of a sp. gr. 2·3; it is a compound of 1 eq. of *calcium*, a metal discovered by Sir H. Davy, and 1 eq. of oxygen. When lime is mixed with a small portion of water, much caloric is evolved, and the water unites with the lime, forming a *hydrate*, or slacked lime. It contains 1 eq. of lime and 1 of water. Hydrate of lime dissolves in the proportion of 13·25 grains in ℥ xx. of water at 32°; 11·6 grains in the same quantity of water at 60°; and only 6·7 grains when the fluid is at 212°; the solubility of the lime diminishing in the ratio of the heat of the water.

The equivalent of lime is 28.

Medical properties and uses.—Quicklime is a powerful escharotic; hence it is never administered internally in the solid form. When it is made into a paste with water and applied to the surface, it attracts the moisture and destroys the vitality of the part; after which it chemically combines with the dead animal matter and forms a saponaceous compound, which is thrown off from the parts below, forming an ulcer. Although quicklime might be thus employed in forming issues, yet it is seldom used for this purpose. When it has been accidentally taken into the stomach, it acts as a powerful erodent poison, causing a burning pain in the gullet and the stomach, with obstinate constipation; it has proved fatal.

Officinal preparations.—*Liquor calcis*, L. D. *Aqua Calcis*, E. *Potassa cum calce*, L. E. *Potassa Caustica cum Calce*, D.

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[1] *Chenevix, Memoirs of the Irish Academy,* 1802.

The calcareous fossils which are medicinally used are,

1. CHALK. *Friable Carbonate of Lime.*

Officinal. CRETA PREPARATA, *Lond.* CRETA, *Edin.* CALCIS CARBONAS, *Dub.* Chalk. Prepared Chalk.

Syn. Craie Blanche (*F.*), Kreide (*G.*), Wite kryt (*Dutch*), Hrid Kride (*Dan.*), Kalabastrace, Krita (*Swed.*), Mel (*Russ.*), Creta, Gasso (*I.*), Greda (*S. Port.*), Khurree muttie (*H.*), Kilo Tynabyaz (*A.*), Simic Chunamboo (*Tam.*), Gāl sifid (*Pers.*), Capoorengrees (*Malay*).

This mineral is found in the north of France, Poland, some of the Danish islands, A′sám, Silhet, and in great abundance in the south of England, within a range which commences at Flamborough Head in Yorkshire, and is continued, with irregular interruptions, in Lincolnshire, Suffolk, Surrey, Sussex, Hampshire, and into Dorsetshire. It occurs massive in beds, and contains numerous relics of land and marine animals.

Qualities.—Chalk is inodorous and insipid; but adheres slightly to the tongue. Its colour is either white, or yellowish, or greyish white. It feels meagre and rough; is not very hard, but is pulverulent; breaks with an earthy fracture; stains the fingers, and marks: its hardness, lustre, and transparency, however, are various. Its specific gravity is from 2·315 to 2·78. It is scarcely soluble in pure water, requiring 1600 parts for its solution; but it is more soluble in water saturated with carbonic acid. It effervesces with acids, and generally contains a small portion of alumina. Its purity is determined by its complete solubility in hydrochloric acid. The average proportion of lime is 53 per cent. The formula of the carbonate is $Ca\ O,\ C\ O_2$.

Medical properties and uses.—Chalk is antacid; but it must undergo levigation and washing, before it can be internally administered. In powder it is advantageously employed as an absorbent in burns and excoriations.

Only Creta preparata is contained in the list of Materia Medica of the London College, for its mode of preparation. See Part III.

2. LIMESTONE. *Hard Carbonate of Lime.*

Officinal. MARMOR, *Edin.* MARMOR ALBUM, *Dub.* Limestone. White Marble.

Syn. Pierre à chaux; chaux carbonatée; Marbre (*F.*), Kalkstein; Weisse marmor (*G.*), Marmo; ossicarbonato di calce (*I.*), Marmol (*S.*), Marmar (*Dan.*), Hürt marmor (*Swed.*), Mramor (*Russ.*), Chunamboo kullo (*Tam.*), Kakote-tung-ŏ-ă (*Esquimaux*).

Although all the varieties of limestone may be regarded as officinal, yet the two varieties particularly designated are *var. a.* of the first sub-species, *common compact limestone*, and *a.* of the second sub-species, *granular foliated limestone*, or *white Carrara marble.* The first is found abundantly in Britain, in extensive strata connected with floetz and coal formations; the second is brought from Carrara,

and Paros, and belongs exclusively to the primitive and transitive mountains.

Qualities.—*Common limestone* is inodorous and insipid, of a grey colour, sometimes variegated with veins, stripes, and clouds of yellow, flesh red, and greenish grey. It is hard and brittle; the fracture is splintery; the fragments are sharp edged, and scarcely translucent. Its sp. gr. is from 2·6 to 2·7.

White marble has a granular texture, white colour, and foliated fracture. But marble may be white, and yet contain magnesia.[1] Pure white marble is tasteless, insoluble in water and in alcohol. Its specific gravity is from 2·7 to 2·84. Both varieties dissolve in acids with effervescence, and contain 56 per cent. of lime, and 44 of carbonic acid.

Use.—Marble is chiefly used for obtaining pure lime, and for various pharmaceutical purposes.

CALX CHLORINATA, *Lond. Edin. Dub.* Chlorinated Lime.

This substance is the common bleaching powder of commerce, and is prepared by exposing hydrate of lime spread out in proper vessels to the action of chlorine, till it has become saturated.

Qualities.—When pure it is white, but, as usually met with, of yellowish or brownish tinge: it possesses in a high degree the odour of chlorine, and has a powerful styptic taste. It is only partially soluble; and, when exposed to the air, either in a dry or moist state, it evolves hypochlorous acid, and carbonate of lime and chloride of calcium are left. When acted upon by weak or dilute acid, hypochlorous acid is evolved; by strong acids, chlorine is set free. Its composition is somewhat doubtful; it is often represented as being composed of 1 equiv. of hypochloride of lime + 1 equiv. of chloride of calcium.

Formula $Ca\,O,\ Cl\,O + Ca\,Cl$.

Medical properties and uses.—It is employed as a disinfectant agent, and also in the preparation of chloroform. The hypochlorous acid evolved from it appears to act upon organic matters in the same way as chlorine. When chlorine comes into contact with sulphuretted hydrogen, it unites with the hydrogen, and causes the precipitation of the sulphur. Sometimes the chlorinated lime has been given internally, but the liquor sodæ chlorinatæ is more fitted for this purpose: again, it is sometimes administered in the form of an enema, to correct the fœtor of the alvine excretions in some diseases.

Dose for internal use from grs. iij. in water sweetened with syrup.

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[1] The white marble from St. Gothard and Iona belongs to the Dolomitic limestone, and contains magnesia.

CAMBOGIA. See *Stalagmites*.

CAMPHORA. See *Laurus Camphora.*

CANELLA. *Spec. Plant. Willd.* ii. 857.

Cl. 11. *Ord.* 1. Dodecandria Monogynia. *Nat. Ord.* Meliaceæ.[1]

G. 942. *Cal.* five sepals. *Pet.* five. *Anthers* 16, adhering to a pitcher-shaped nectary. *Berry* one-celled, with two or four seeds.

Sp. 1. C. *alba.*[2] White or Laurel-leaved Canella. *Med. Bot. 3d edit.* 694. *t.* 237. *Trans. Linn. Soc. vol.* i. 96. *t.* 8. *Browne Jam.* 215. *t.* 37. fig. 3. *Hayne*, ix. 3.

Officinal. CANELLA, *Lond. Edin. Dub.* CANELLA ALBA. Canella, or wild Cinnamon Bark.

Syn. Cannelle blanche (*F.*), Weisser Zimmt (*G.*), Hwit Kanel (*Swed.*), Hvid Kanul (*Dan.*), Cannella bianca (*I.*), Canela blanca (*S.*).

This tree is a native of the West India islands, growing in the inland woods. It rises very straight, from forty to fifty feet in height. The branches are erect, not spreading, and only at the top of the tree; furnished with spatulate leaves, irregularly alternate, entire, nerveless, of a yellowish-green colour, dotted when young, thick and shining like those of the laurel, and emitting a similar odour. The flowers, which exhale a powerful aromatic perfume, are small and of a purple colour, in clusters upon divided foot-stalks at the summits of the branches. The calyx is of one piece, small, persistent, and deeply tripartite; the petals are five times as long as the calyx, oblong, sessile, concave, erect, two a little narrower than the others. The anthers are twenty-one in number, distinct, fixed longitudinally to the outside of the stamens, which form a tube. The ovary is superior, ovate; the style cylindrical, with two rough, convex, blunt stigmas. The fruit is an oblong, one-celled, glossy, black-bluish berry, about the size of a pea.

The inner bark of the branches is freed from the cuticle, and dried in the shade. It is brought to this country packed in casks and cases, in different sized pieces, some rolled in quills, and others flat: the quilled sort is considerably thicker than cinnamon, and the flat nearly one-fourth of an inch in thickness.

Qualities.—The quilled pieces of canella are of a whitish yellow colour on both sides, and break with a starchy fracture; the flat

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[1] Lindley places canella in a distinct order of its own, to which he has given the name *Canelleæ.*—*Flora Medica*, p. 116.

[2] This plant has been often confounded with the *Wintera aromatica*, an error authorised in some degree by Linnæus, who combined the two genera of Winterana and Canella under the name of *Laurus Winterana;* but afterwards made this a distinct genus with one species, under the title *Winterana canella*, a name by which it was known till Professor Murray corrected the error, and made a distinct genus of canella.—Vide *Syst. Veg.* 14th edit. 443. Sir Hans Sloane stated the error of confounding this bark with the *Cortex Winteranus*, in his description of the tree in the *Phil. Trans.* vol. xvii. p. 465.

pieces, which appear to be the bark of the largest branches or of the stem, are yellow on the outside and pale brown within. The odour of both kinds, when fresh broken, is aromatic, something like a mixture of cloves and cinnamon; and the taste slightly bitter, extremely warm and pungent. Although boiling water takes up nearly one-fourth of the weight of this bark, yet the infusion possesses but little of its warmth and pungency; the bitter chiefly predominating. Alcohol extracts all its qualities in perfection: the tincture is bright yellow, and becomes milky on the addition of water. The infusion is not altered by infusion of galls, the sulphates of iron and of zinc, bichloride of mercury, nor tartarized antimony; but nitrate of silver and acetate and diacetate of lead render it milky, and throw down precipitates. By distillation with water, Canella *alba* affords a thick, heavy, yellow, very pungent, gratefully odorous, *volatile oil;* on which, and a little *bitter extractive* and *resin,* its virtues seem to depend. It contains also *starch, albumen, mannite*[1], *gum,* some *acetate* and *oxalate of lime,* and *chloride of calcium.*

Medical properties and uses.—This bark is stimulant, and slightly tonic. It is a useful adjunct to bitters in some cases of dyspepsia and atonic gout; but it is employed chiefly on account of its flavour, and to correct the griping quality of the resinous cathartics. It is said to prove useful in scurvy.[2]

The dose of the powdered bark is from grs. x. to ʒ ss.

CANNABIS INDICA, *Dub.* INDIAN HEMP.

This plant has now been introduced into the Dublin Materia Medica. For some years (since 1839), preparations of it have been employed in medicine in this country; and it appears to have been long ago used by the Hindoos, Persians, and Arabians. It appears that the Cannabis *Indica* is the same plant as the common European hemp, or the Cannabis *sativa;* difference of climate causing a difference in the production of a copious resinous secretion from the Indian plant. Cannabis *Indica* belongs to the natural order, *Urticaceæ,* or, according to Dr. Lindley, the order *Cannabinaceæ;* and to the Linnæan class and order, *Diœcia Pentandria.* The plant is from three to six feet high, stem angular, pubescent, branching; leaves on long, weak petioles, digitate, serrated, and scabrous. Flowers diœcious. *Males:* calyx five-parted, stamens five. *Females:* calyx one-leaved, rolled up, styles two.

At the flowering period, the Indian hemp abounds with resin, which exudes from nearly all parts of the plant. When collected separately, it is called *Churrus.* The plants containing the resin,

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[1] The mannite, or saccharine principle of Canella, has been dignified by the name of *Canellin.*

[2] This bark and the fruit of the capsicum were formerly common ingredients in the food and drink of the Caraibs, the ancient inhabitants of the Antilles; and at present it enters the meagre pot of the negroes.—*Linn. Trans.* l. c.

collected into bundles, passes under the name of *Gunjah;* the large leaves and capsules are known by the name of *Bhang, Subjee,* or *Sidhee.* The part made officinal by the Dublin College is the extract or churrus, which is ordered to be purified, and then passes under the name of *Extractum Cannabis Indicæ purificatum.* See Part III.

Qualities.—The analyses which have been made of the hemp plant have, as yet, thrown but little light on its medical qualities. The seeds of the common hemp are oleaginous and demulcent, and certainly possess no narcotic properties; the leaves of the plant have yielded, as yet, no peculiar principle. The resinous exudation of the Indian hemp, which has been named *Cannabin,* and upon which the virtues of the plant seem to depend, has the following properties. It is insoluble in water, but soluble in alcohol and ether; from its alcoholic solution it is precipitated by water; the resin is soft at the ordinary temperatures; its taste is aromatic, but acrid; no crystalline principle has been discovered in it. A trace of volatile oil can be obtained by distilling the plant with water.

Medical properties and uses.—Indian hemp, when taken internally, acts upon the cerebro-spinal system, producing a species of intoxication or delirium, and a sensation of wildness, followed by disposition to sleep, and afterwards by vertigo and loss of memory; it also frequently causes numbness, and a want of power over the extremities. The pulse is usually slightly increased, at first, both in force and frequency. It appears also that the natives of India and the East are much more affected by this drug than those of more northern climates; and likewise that carnivorous animals are more easily brought under its influence than the herbivora. It seems to act as an aphrodisiac. In medicine it has been used as an *antispasmodic* in convulsive diseases, as chorea, tetanus, hydrophobia, pertussis, asthma, and other spasmodic coughs; as an *anodyne* in the different forms of neuralgia, as sciatica, lumbago; also in chronic rheumatism; and, as a *narcotic,* to procure sleep in different diseased conditions of the system, an occasional substitute for opium.

The expectations as to its good effects, which were entertained when its use was first introduced into this country by Dr. O'Shaughnessy, have by no means been realized; still, in some cases, much benefit has been derived from its administration.

In large doses it is stated to communicate an odour to the urine similar to the tincture mixed with water, and partly like the Tonquin bean.[1]

The most usual forms of administering the drug are the extract and the tincture, both of which are now officinal in the Dublin Pharmacopœia.

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[1] *Ballard* and *Garrod, Elements of Materia Medica.*

The dose of the extract is from ½ to v grs.; of the tincture ♏ xx. to f ʒ j.

Officinal preparations.—*Extractum Cannabis Indicæ purificatum,* D. *Tinctura Cannabis Indicæ,* D.

CANNA EDULIS. *Dub.* The plant whose root is supposed to furnish the fecula called *Tous-les-mois.*

This fecula, now referred to the Canna *edulis* by the Dublin College, on the authority of Ker, was formerly supposed to be derived from the Canna *coccinea.* The Canna *edulis* belongs to the Linnæan class and order *Monandria Monogynia,* and to the natural order *Marantaceæ.* In Dr. Lindley's *Medical and Economical Botany,* this plant is described as "tuberous; stem purple, leaves broad, smooth, glaucous; corolla tripartite, erect, with oval, oblong, retuse segments, of which the middle one is much the shortest; lips linear, revolute, emarginate." The plant is supposed to be a native of the West Indies. Dr. Lindley regards Peru as its habitation. Many other species, as Canna *Indica,* Canna *glauca,* and Canna *achira,* yield a similar starch.

Qualities.—Tous-les-mois starch resembles very closely potato-starch, and to the naked eye has a glistening appearance, due to the size of the granules. Under the microscope the grains are oblong, oval, showing a concentric structure. Dr. Pereira, from an examination made for him by Mr. George Jackson, states that the most prevalent size of the granules is from 0·0025 to 0·0032 inch in length, a size much greater than that of the potato starch, the only one with which it can be well confounded. In chemical composition tous-les-mois is the same as other starches, and it exhibits the same reactions. It forms a firm jelly with boiling water, and is used in the same manner, and for the same purposes, as arrowroot.

CANTHARIS.

D. 3. Articulata. *Cl.* 4. Insecta. *Ord.* 5. Coleoptera. *Cuvier.*

Feelers filiform. *Palpi* four, unequal—the posterior ones clubbed. *Thorax* nearly round. *Head* inflected, gibbous. *Elytra* soft, flexible.

Species 1. Cantharis *vesicatoria.* Blistering Fly. *Latreille, tom.* ii. *p.* 220. *Lamarck, Hist. Nat. des Animaux sans Vertèbres.*

Officinal. CANTHARIS, *Lond. Edin. Dub.* Blistering or Spanish Fly. Cantharides.

Syn. Cantharides (*F.*), Spanische Fliegen Kantharide (*G.*), Spaansche Vliegen, (*Dutch*), Spanska fluger (*Swed.*), Spanske fluer (*Dan.*), Shpanskaia mucha (*Russ.*), Machy Hisapanskie (*Pol.*), Cantarelle (*I.*), Cantharidas (*S.*), Cantharidas (*Port.*).

This insect is found on the privet, ash, elder, lilac, white poplar, and the Tartarian honeysuckle, in Spain, Italy, France, and to a certain extent over the greater part of Europe. It is about two-thirds of an inch in length, and one-fourth of an inch in breadth; with long, flexible elytra or wing sheaths, shining green, marked

with three longitudinal raised golden stripes, and covering brown, membranous, transparent wings. The body is terminated by two small, callous, sharp spines, and on the head are two black, jointed antennæ. The mandibles are strong, equal, and terminate in a point: there are no teeth. The jaws are partly bony, partly membranous; lobated. The corslet is small, square, and less than the abdomen. The feet are furnished with filiform tarsi, and terminated by a double pair of long, curved, horny hooks. The larva of the cantharis live in the ground, and it comes forth as a fly, or beetle, in May. When alive cantharides have a fœtid odour.[1] They are gathered at dawn, when they are torpid, by men in masks and with gloves, who beat the bushes on which they congregate at night; or, sometimes, by smoking with brimstone the trees on which they are found, and catching them on a cloth spread underneath. When they are sometimes simply shaken from the trees, they are killed by the steams of boiling vinegar, and dried either by the sun or in a stove.

Blistering flies are imported from St. Petersburg and Astracan, packed in casks and small chests: some come from Messina. The best are of a lively fresh colour, a small size, and not mouldy, nor mixed with the Melolontha *vitis*, an insect resembling them in some degree, but possessing no vesicating property. It may be distinguished by its form, which is altogether more square than that of the cantharis, and by its black feet.[2] If the blistering flies have been properly dried, and are kept in a well-stopped glass bottle, they will remain unchanged in appearance, and retain their acrimony for a great length of time[3]; but sometimes, in spite of every precaution, they are attacked by a small worm, which, however, feeds on the soft parts only of the fly, reducing it to a powder that still possesses the active quality of the entire insect. They soon putrefy when kept in a damp place, and therefore should be occasionally spread out to the air. In the East Indies the Meloë *trianthemum* is used; in China the Mylabris *variabilis*, a variety of M. *Chicorii*, is employed, and has lately been used to a limited extent in this country: and in other parts, the Cantharis *vitta* and Meloë *Majalis* are substituted for the blistering beetle.

Qualities. — Blistering flies have a heavy disagreeable odour, and an acrid taste. Lewis found that their active constituents are soluble both in water and in alcohol, and that the residuum is

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[1] It is ascertained that a person who sits under a tree on which many of these insects are, particularly at the time of copulation, experiences ardor urinæ, pain of the bladder, and sometimes ophthalmia.

[2] Fabricius thus describes the Melolontha: "*Maxilla* brevis cornea; apice multidentata. *Antennæ* lamellatæ. Melolontha *vitis.* Viridis, thoracis lateribus flavis, pedes nigri." — Vide *Rœmer, Gen. Insect.* t. l. fig. 11.

[3] Van Swieten kept them upwards of 30 years in a glass vessel not particularly well corked, and they still produced vesication.

inert. Thouvenel, Beaupoil, and Robiquet have analyzed the insect.

Thouvenel treated the entire flies with *water, alcohol,* and *ether,* separately, submitting them to the press; and obtained the following results: 1st, Three-eighths of reddish yellow, very *bitter extractive,* affording by distillation an acid liquor: 2d, One-tenth of *concrete, waxy, green oil,* having the odour of the flies, and yielding by distillation a very sharp acid and a thick oil: 3d, One-fiftieth of *concrete, yellow oil,* apparently the colouring matter of the insect: and, 4th, One-half of solid *parenchymatous matter.* He imagined that the blistering principle resides in the green waxy oil; and that the strangury produced by blisters is the effect of the acid obtained from this oil by distillation.[1]

Beaupoil found that an aqueous infusion of the flies, when exposed to the air, lets fall a yellow precipitate, exhales an ammoniacal odour, and reddens tincture of turnsol: the addition of ether or alcohol divides it into two parts; viz. a black *gluey matter,* insoluble in alcohol, and a yellowish-brown, very *soluble matter.*[2] The black matter blistered the skin without affecting the urinary organs; the yellow matter did not blister when applied alone, but blistered quickly when united with wax; and a *green matter,* which he also obtained, blistered under similar circumstances, but less actively.

Robiquet asserts, that the flies, when recently collected, yield some uric acid, derived probably from the tubuli uriniferi. By treating them with water, alcohol, and ether, he obtained a peculiar matter in the form of small prismatic crystals, insoluble in water, and little soluble in cold alcohol, but soluble in boiling alcohol, in ether, acetic acid, and oils; fusing at 210° F., volatilizing at higher temperatures, and giving off very acrid fumes; on the presence of this body the vesicating property of the flies depends. Dr. Thompson named it *Cantharidin.*[3] It is a neutral body, and has a formula, $C_{10}\,H_6\,O_4$. The other matters, which Robiquet procured, were, a *green fatty oil,* soluble in alcohol; a *fatty matter,* insoluble in alcohol; a *yellow viscid substance,* soluble in water and in alcohol; a *black matter,* soluble in water, not in alcohol; *yellow matter,* soluble in alcohol and in ether; free *acetic* and *uric acids;* and *phosphate* of *lime* and of *magnesia.* Orfila has found that by distillation a volatile principle is procured, on which the fœtid odour of the beetle depends. Thierry's method of procuring

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[1] *Ann. de Chim.* xlvii. 280.

[2] From one ounce of cantharides he obtained, of black matter, 2 gros. 2 grs.; yellow matter, 1—2; green matter, 1—8; parenchyma, 4—36; phosphate of lime, 12 grains; carbonate of lime, 2 grains; sulphate and muriate of lime, 4 grains; oxide of iron, 2 grains; and an acid, the quantity of which was not ascertained.—*Ann. de Chim.* xlviii. 33.

[3] Dioscorides and Galen imagined that the active principle of the fly was contained in its body, and that the head, wings, and feet contained its antidote.

Cantharidin is, to macerate the bruised beetle in ether for several days, in an apparatus for filtering by displacement; adding, after the liquid ceases to flow out, fresh portions of ether, till the soluble matter is exhausted. Then pour water on the mass to displace the ether. The etherial tincture is next to be distilled, and the deposit from the residue, when cold, is to be treated with boiling alcohol and animal charcoal. The cantharidin is thus obtained pure in crystals: 1000 parts of cantharides yield four parts of pure cantharidin. A more simple method is to make, by percolation, a strong alcoholic tincture, and leave it to spontaneous evaporation. The cantharidin, which then forms, is decolorized by animal charcoal, and recrystallized out of alcohol. It is soluble in strong sulphuric acid when boiled in it, and also in nitric and hydrochloric acids without change.

Medical properties and uses. — Blistering flies, internally exhibited, are powerfully stimulant and diuretic; and, externally applied, rubefacient and epispastic. Notwithstanding their acrimony, they appear to have been given as an internal remedy by Hippocrates, who prescribed them chiefly in cases of dropsy and amenorrhœa.[1] They have a considerable effect on the urinary organs, even when externally applied; and unless the dose be moderate, and their internal exhibition be conducted with caution, they act with so much violence on the kidneys, bladder, and small intestines, as to produce bloody urine, purulent stools, insupportable pains of the abdomen, vomiting, and other symptoms of intestinal inflammation; convulsions, delirium, syncope, and death. They have, however, been successfully employed in dropsy, obstinate gleet [2], leucorrhœa, and incontinence of urine arising from paralysis of the sphincter vesicæ. The free use of diluents, as milk, almond emulsion, and mucilaginous solutions, is absolutely necessary during their employment to moderate their action. These symptoms rarely occur when the tincture is used. I have carried the dose of it to f ʒ j. twice a day for several successive weeks. The tincture is, therefore, the most proper form for internal use; or, if given in substance, the dose should not exceed one grain of the powdered flies, formed into a pill with opium or extract of henbane. Cantharides appear to act on the nervous system and also on the skin, and hence have been given in cases of paralysis, and also in chronic cutaneous affections. In large doses they operate as an irritant poison, causing burning heat in the

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[1] Dr. Groenvelt was prosecuted by the College of Physicians, for using cantharides internally, and published his tract, "*De tuto Cantharidum usu interno*," as his vindication; but although it proved to his persecutors the safety of his practice, yet (says *Quincy*, *Pharm.* p. 152.) it ruined the unhappy doctor.

[2] Probably gleets were included in the term gonorrhœa by the old writers, who frequently mention cantharides as a remedy for gonorrhœa. Thus Boccone (*Museo di Fisica*, 1699) says, they were much used by the Sicilians in gonorrhœa.

stomach, dryness of the mouth, sometimes ptyalism, severe strangury, bloody urine in drops, violent griping, purging of blood, extreme tenderness of the abdomen, delirium and coma, terminating in death.

Blistering flies, when applied to the skin, act as a local stimulant, first reddening and inflaming the part, and then producing from the exhalants a copious discharge of serum under the cuticle, which is raised and forms a blister. These effects they produce more certainly and completely than any vegetable acrid, and therefore they may be employed either as rubefacients, or as blistering agents.

It is uncertain whether blisters were used by the ancients; but modern practitioners daily and successfully employ them. Although their first operation is local, yet, under certain circumstances, the stimulus is sufficient to rouse the whole nervous energy, and excite the general system so as to render their application useful in diseases of diminished excitement; on which account, in deep-seated local affections, when the inflammatory diathesis is considerable, the force of the circulation must be diminished by bleeding, purging, or other evacuants, before blisters can be advantageously applied. The diseases of debility in which they are useful are low nervous fever, when accompanied with delirium, pale urine, frequent sighing, great anxiety, deafness, a fixed stare and glistening eyes. In palsy, and gutta serena, they are applied to the forehead over the supra-orbital nerve. They are found efficacious also in spasmodic and convulsive affections, from the inflammation they produce overcoming the morbid irritation which induced the spasm. Blisters, by their local action, relieve internal inflammatory diseases, by altering the balance of the circulation; partly, also, by diverting the attention from the prior seat of pain, contrary to the opinions of the ancient physicians, who attributed much of their efficacy to the serous effusion which they induce. Hence their utility in ophthalmia, applied behind the ears, on the temples, or on the forehead; in phrenitis, over the head; in cynanche tonsillaris, and in small-pox, when the swelling of the fauces affects respiration, upon or near the neck; and in phthisis, catarrh, hepatitis, pneumonia, gastritis, and other internal inflammations, they should be applied immediately over the seat of pain. In sciatica they have been found very useful. On the same principle caries in the bones and joints, or a disposition to it, is often cured by the repeated application of blisters. "Under the application the enlargements obviously subside; the crepitation between the bones, the consequence of the abrasion of the cartilages, ceases to be felt when the blister begins to operate, the use of the joint is effectually recovered, and anchylosis prevented."[1] A succession

[1] *Ford, on Diseases of the Hip-joint,* p. 53.

of blisters, also, to the vicinity of an inflamed organ, is more beneficial than a protracted discharge from one; and a second blister often relieves after the first has failed. Blisters are contra-indicated in diseases of great debility, where there is a tendency to mortification; as in the low stages of petechial fevers, cynanche maligna, confluent small-pox, and malignant measles; and in dropsy, in which they are apt to occasion a very painful, dangerous erysipelas, and gangrene. Peculiar idiosyncrasies forbid their use in some persons, as they irritate, heat, produce thirst, pain, tremors, and sometimes convulsions. In those of irritable temperament, their application is often attended with strangury and bloody urine; and this effect is much increased if the blister-plaster be applied over a newly-shaved part, or if it be allowed to remain too long on after the blister has risen. To prevent strangury from the application of blisters, camphor has been erroneously regarded as a specific. It is more effectually prevented and relieved by copious dilution with milk, and mucilaginous fluids, by fomentations of warm milk and water to the blistered part after the removal of the plaster, by the introduction of an opium suppository into the rectum; and by interposing between the vesicatory and the skin a piece of gauze, wetted with vinegar, and applied smooth and close over the plaster; or a piece of silver paper moistened with oil.[1]

The internal dose of cantharides is from gr. j. to grs. iij. Various blistering tissues, said to be made of cantharidin, have been lately introduced to the profession; all of them answer the purpose of raising blisters, and are much cleaner and more elegant than the ordinary blistering plaster.

Officinal preparations.—*Tinctura Cantharidis*, L. E. D. *Acetum Cantharidis*, L. E. D. *Emplastrum Cantharidis*, L. E. D. *Emplastrum Cantharidis compositum*, E. *Emplastrum calefaciens*, D. *Ceratum Cantharidis*, L. *Unguentum infusi Cantharidis*, E. *Unguentum Cantharidis*, L. E. D.

CAPSICUM. *Spec. Plant. Willd.* i. 1050.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Solanaceæ.

G. 334. *Corolla* wheel-shaped. *Berry* without juice.

Sp. 1. C. *annuum.* Annual Capsicum.[2] *Med. Bot. 2d ed.* 226. *t.* 80. *Hayne*, x. 24. Capsicum *fastigiatum* (*Blume*).

Officinal. CAPSICUM, *Lond. Edin. Dub.* Fruit of Capsicum *fastigiatum, L.* Fruit of Capsicum *annuum, E. D.* Capsicum. Chilli.

Syn. Poivre d'Inde (*F.*), Spanische oderturkircher pfeffer (*G.*), Iaarlykse Spaansche peper (*Dutch*), Baelg-peber (*Dan.*), Spansk peppar (*Swed.*), Pieprzyea (*Pol.*), Pepperone (*I.*), Pimienta das Indias (*S.*), Pimentao da India (*Port.*), Perets stratschkovoi (*Russ.*), L'ul Mirch (*H.*), Brāhn Maricha (*San.*), Mollaghai (*Tam.*), Filfil surkh (*Pers.*), Felfel (*Arab.*), Lornbak (*Jav.*), Chabai (*Malay*).

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[1] In America, Cantharis *cinerea*, C. *vittata*, C. *marginata*, and C. *atrata* have been used instead of common cantharides. In the Brazils C. *atomaria*, in Sumatra C. *ruficeps*, and in Arabia C. *Syriaca*, are used. They raise a blister as speedily as the officinal cantharis, and are said not to occasion strangury.

[2] Sprengel, in his *History of Botany*, under the head "*Plinius*," says, "Capsicum annuum sine dubio est ea piperitis, quam et siliquastrum vocat."—(20. 17.)

Capsicum *annuum* is an annual plant, a native of America, of both the Indies, and cultivated all over Europe. It flowers in June or July, and the fruit is ripe in October. The stem is herbaceous, roundish, smooth, crooked, branching, and rising two or three feet in height. The leaves are ovate, smooth, entire, acuminate, placed on long foot-stalks in an irregular order. The flowers are peduncled, axillary, solitary, and white: the calyx is five-toothed, tubular, and persistent; the corolla wheel-shaped, five-cleft, the segments pointed and plaited: the filaments are short, tapering, with oblong anthers; and the germen is ovate, supporting a slender style, which is longer than the filaments, and terminated by a blunt stigma. The fruit is a long, conical, pendulous, pod-like berry, of a shining orange-scarlet, or sometimes yellow colour, two-celled, and containing a dry spongy pulp, with several flat, kidney-shaped seeds. The berry of this species of capsicum is two or three inches long; the breadth one-half to two-thirds of an inch. The cuticle is tough and coriaceous.

Many varieties of this species of capsicum enter into the composition of Cayenne pepper: but, certainly, the best which is brought home from the West Indies, ready prepared, is made from the Capsicum *baccatum* (Bird pepper), or the Capsicum *frutescens*. Cayenne pepper is often mixed with chloride of sodium; and, sometimes, with a less innocent substance, the red oxide of lead. This fraud may be discovered by boiling some of the suspected pepper in vinegar, and after filtering the decoction, adding to it a solution of sulphuretted hydrogen gas, which will throw down a black precipitate, if the pepper contain oxide of lead: a white precipitate will be produced, when the decoction is tested with nitrate of silver, if chloride of sodium be present.

By the London College the fruit is ordered to be less than one inch in length.

Qualities.— Capsicum berries have a red colour, an aromatic odour, which is somewhat impaired by drying; and an aromatic, extremely pungent, acrid taste, setting the mouth, as it were, on fire, and the impression remaining long on the palate. These sensible qualities are imparted to water, alcohol, and ether. Half a drachm of the powder infused in f ℥ jss. of boiling water lost grs. xij. The infusion is precipitated by infusion of galls, and alcohol dissolves the precipitate. It is also precipitated by nitrate of silver, bichloride of mercury, acetate of lead, the sulphates of iron, of zinc, and of copper, the alkaline carbonates, and alum: but it is not altered by the mineral acids, the solution of potassa, nor by silicized potassa. The etherial tincture, when evaporated on the surface of water, leaves an orange-coloured resin, in which the pungency of the capsicum is concentrated. These experiments point out the substances which are incompatible in formula with infusions of capsicum. Braconnot acted upon the capsicum, freed

from seeds, with strong alcohol: on evaporating the tincture, a coloured wax first separated, and, secondly, an extract, by evaporating the residuary fluid. On treating this extract with ether, he procured a soft reddish-brown oleo-resin, which possesses in an eminent degree the properties of the capsicum: this he called *Capsicin.*[1] It exists in the proportion of 1·9 per cent. of the pods: it is scarcely soluble in water or in vinegar, but very soluble in ether, alcohol, the volatile oils, and liquor potassæ. Besides this, Braconnot procured 6·0 of *pectic acid,* 5·0 of an *azotized matter,* 9 of *starch,* 0·9 of a *red colouring matter,* 9·4 of *citrate of potassa, phosphate of potassa, chloride of potassium,* and 67·8 of *lignin*[2] = 100·0 of capsicum.

Medical properties and uses.— The fruit of the capsicum and Cayenne pepper are powerful stimulants, unaccompanied with any narcotic property. As condiments they are generally used both in tropical and temperate climates; and capsicum appears to have been used by the Romans.[3] It has been successfully given in atonic gout, in dyspepsia, when accompanied with much flatulence; in tympanitis, and paralysis. In dropsies, and other cachectic complaints, when chalybeates are indicated, a small portion of powdered capsicum is recommended as an excellent addition by Dr. Wright; and Bergius says, that he used it with success in obstinate intermittents.[4] I have had sufficient experience of its efficacy as an adjunct to cinchona bark in intermittents; and also in lethargic affections[5]; but the diseases in which capsicum has been found most useful are cynanche maligna and scarletina maligna, in which it is administered internally, and also used as a gargle. Its sensible effects are heat in the stomach, and a general glow over the body, without much acceleration of the pulse; and, as a gargle, it cleans without impeding the healing of the ulcers of the fauces. Cataplasms of capsicum operate as powerful rubefacients without blistering the skin, and are used in the West Indies to relieve the coma and delirium, which, almost constantly, attend tropical fevers. The diluted juice of the fruit is said to be a sovereign remedy in ophthalmia from relaxation. The powder applied to a relaxed uvula, or the tincture brushed over it, are most useful stimulants.

Capsicum may be given in the form of pills, in doses from grs. v. to grs. x.; or f ʒ ss. to f ʒ ij. of the tincture (Part III.). The gargle usually employed is made by kneading into a paste ʒ j. of *Cayenne pepper* and ℈ j. of *common salt;* then adding f ℥ vj. of

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[1] Capsicin is so acrid that, when volatilised by heat in a large room, it causes all in the room to cough and sneeze.

[2] *Ann. de Chim. Phys.* vi. 122.

[3] *Pliny.*

[4] *Mat. Med. e Regno Veg.* i. 44.

[5] Dr. Paris says that *Rymer's Cardiac Tincture* is an infusion of capsicum, camphor, cardamom seeds, rhubarb, aloes, and castor, in proof spirit, with a small quantity of sulphuric acid.— *Pharmacologia.*

boiling water; and to the strained solution, f ʒ iv. of vinegar. But a simple addition of f ʒ iij. of the tincture to f ℥ vj. of water, or of infusion of roses, answers equally well.

Officinal preparations.—*Tinctura Capsici*, L. E. D.

CARBO ANIMALIS, *Lond. Edin. Dub.* Charcoal (prepared from bullock's blood, *L.*). Impure Animal Charcoal, *E.* Ivory Black, *D.*

Syn. Charbon animal (*F.*), Thierische kohle (*G.*), Carbone animale (*I.*), Givotnoi ugol (*Russ.*).

Most animal substances, when exposed to a high temperature in close vessels, are converted into charcoal; but the animal charcoal, inserted in the list of Materia Medica by the Edinburgh and Dublin Colleges of Physicians, is prepared chiefly from bones or from ivory; whilst that which is now officinal in the London Materia Medica is made from blood by calcination. When prepared from bones it contains a very large per centage of earthy matters; that derived from the incineration of blood contains much less. But for chemical purposes, where the presence of these matters would be injurious, both kinds require to be purified by digestion in hydrochloric acid, in order to dissolve them out. See Preparations of *Carbon*, Part III.

Qualities.—Bone or ivory black occurs as a rather heavy black substance, without odour or taste; sometimes in the form of coarse powder, or nodules, as used by sugar refiners, or in shape of the bones from which it is prepared; when obtained from blood, in the form of a finer powder. Dumas found that, when prepared from the bones of animals, it contained 10 per cent. of carbon, 88 per cent. of phosphate and carbonate of lime, 2 per cent. of carburet and silicet of iron, with traces of sulphuret of calcium and iron. Dr. Christison states, that he has found as much as 20 per cent. in the ivory black of the shops in this country.

The properties and pharmacopœial and medicinal uses of animal charcoal will be found in Part III., under *Carbo Animalis purificatus.*

Officinal preparation.—*Carbo Animalis purificatus*, E. D. See Part III.

CARBO, *Lond.* CARBO LIGNI, *Edin. Dub.*

Syn. Charbon de bois purifié (*F.*), Reine kohle (*G.*), Koole (*Dutch*), Kol (*Swed.*), Carbone di legna (*I.*), Carbon de lena (*S.*), Brevesnoi nol (*Russ.*), Adapoo currie (*Tam.*), Fuhm chobio (*Arab.*), Zegal chobic (*Pers.*), Koyla (*H.*), Arang (*Malay*).

Wood charcoal is prepared for the common purposes of fuel, by piling up billets of wood into conical heaps, which are covered with earth and sods, and then burned, with as little exposure to the action of the air as possible; but for the preparation of the finer kinds of charcoal, fit for medicinal use, the following process is employed:—the wood to be charred is put into a large cast-

iron cylinder, fixed in masonry over a grate. This cylinder terminates at one end in a curved pipe, and the other end is furnished with a door, which is accurately closed after the wood is introduced: a fire is next lighted in the grate; and the water, empyreumatic acid, and volatile parts of the wood, are driven off through the curved tube by the heat, which is increased until the contents of the cylinder become red-hot. The fire is then withdrawn, the cylinder is allowed to cool: and a black, shining, pure charcoal is thus obtained.[1] For internal use, however, it is necessary to have wood charcoal still purer; and to effect this, the process of M. Lowitz is to be preferred. The charcoal is to be reduced to fine powder, and put into a crucible (so as to fill it), on which a pierced cover must be luted. This vessel is then to be heated red-hot, and kept so, as long as a blue flame appears to issue from the hole in the cover; and when this stops, it is to be taken from the fire, cooled in a dry place, and the charcoal, instantly, put into well-stopped bottles for use.[2]

In whatever manner prepared, the purest charcoal contains, generally, from one to two-fiftieths of its weight of earthy salts, viz. phosphate and carbonate of lime, silica, iron, sulphuret of calcium, &c. The salts and earthy matters can be separated by boiling the charcoal with diluted hydrochloric acid in excess; then washing the charcoal on a filter with boiling water, until the fluid passes free from acid, and throws down no precipitate with oxalate of ammonia. The powder is finally to be dried in a stove.

Qualities.—Pure charcoal is inodorous and insipid; black, shining, and brittle. It is a good conductor of electricity. Its sp. gr. is about 3·5. When newly prepared, it absorbs air, gases, and moisture from the atmosphere, so as to increase its weight from 10 to 18 per cent., according to the kind of wood from which it is made.[3] It is insoluble in water and every other fluid, and is easily pulverized. When excluded from air, it is not affected by the highest degree of heat. When pure and deprived of all earths and salts[4], it corrects the fœtid odour of putrefying animal and vegetable bodies; and destroys the odour, taste, and colour of

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[1] This process was invented by Bishop Watson, for the use of the gunpowder manufacturers, who require a very pure charcoal.—*Aikin's Chem. Dict.*, art. *Carbon.*

[2] *Crell's Chem. Journ.* vol. ii. p. 270.

[3] From the experiments of Allen and Pepys, charcoal from fir gained 13 per cent.; from box, 14; from beech, 16·3; from oak, 16·5; from mahogany, 18.

Absorption of Gases by Charcoal.

Ammonia	90	Nitrous oxide	40	Oxygen	9·2
Hydrochloric acid	85	Carbonic acid	35	Nitrogen	7·5
Sulphurous acid	65	Bicarb. of hydrogen	35	Carb. hydrogen	5·
Hydro-sulph. acid	55	Carbonic oxide	9·4	Hydrogen	1·7

[4] The quantity of these varies according to the kind of wood that the charcoal is made from. The following table, formed from experiments of Berthier (*Traité des*

some substances, particularly of mucilages and oil, and matters in which extractive abounds. Thus common vinegar becomes colourless when it is boiled in pure charcoal powder; water, which has become fœtid at sea, is purified by filtering it through charcoal; and that intended for long voyages may be preserved perfectly pure by thoroughly charring the insides of the casks.[1] The decoloring and deodorizing powers of wood charcoal are, however, far inferior to those of animal charcoal. See *Carbo Animalis purificatus*, Part III.

Medical properties and uses.— Charcoal is evidently an antiseptic; and, as such, it has been given internally to correct the putrid eructations of some kinds of dyspepsia. But, in order that it may produce this effect, it should either be newly prepared, or such as has been preserved in very well-stopped bottles. It is probable that it operates both by correcting the fœtor, and absorbing the gas generated in the stomach, as well as checking the decomposition of the undigested aliment. Dr. Calcagno, an Italian physician, proposed to employ it instead of cinchona bark in intermittents[2]; but this suggestion has not been supported by British practitioners. It has been applied, advantageously, mixed up in powder with boiled bread, or linseed meal and water, as a poultice, to foul ulcers and grangrenous sores; and it is undoubtedly, in combination with powdered catechu, kino, or rhatany root, the best toothpowder known.

The dose of charcoal may be from grs. x. to ʒ j. combined with rhubarb.

Officinal preparations.— *Cataplasma Carbonis*, L.

CARDAMOMUM. See *Alpinia Cardamomum.*

CARICÆ FRUCTUS. See *Ficus carica.*

CAROTA. See *Daucus.*

Essais par la Voie siche, t. i. p. 286. Paris, 1834), is copied from *Pereira's Elements,* vol. i. p. 329.

	Poplar.	Maple.	Ash.	Fir.	Alder.	Birch.	Oak.	Hazel.
Carbon - - -	85·6	85·2	83·2	90·3	90·2	88·1	88·0	87·7
Calcined ashes - -	1·0	1·0	1·8	2·2	1·8	1·9	2·0	2·0
Volatile matters -	3·4	13·8	15·0	7·5	8·0	10·0	10·0	10·3
Charcoal - - -	100·0	100·0	100·0	100·0	100·0	100·0	100·0	100·0

[1] Wood soot, *Fuligo ligni*, may be regarded as a variety of charcoal.
[2] Vide *London Med. Repos.* vol. iii. p. 7.

CARUM.[1] *Spec. Plant. Willd.* i. 1470.
Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. Ord.* Umbelliferæ.
G. 561. *Fruit* ovate-oblong, striated. *Involucre* one-leaved. *Petals* keeled, inflex, emarginated.
Sp. 1. C. *Carui.* Common Carraway. *Med. Bot. 3d ed.* 102. *t.* 41. *Smith's Flora Britan.* 330. *Hayne,* vii. 19.
Officinal. CARUI, *Lond. Edin. Dub.* Carraway Seeds.

Syn. Carvi (*F.*), Kummel samen (*G.*), Veldkemyn, Kerwe (*Dutch*), Kommen (*Dan.*), Bröd kummin (*Swed.*), Karny (*Pol.*), Tmin (*Russ.*), Carvi (*I.*), Alcaravea (*S.*), Alcaravia (*Port.*), Dshintan (*Jav.*).

Carraway is an indigenous, biennial, umbelliferous plant, growing wild in meadows and pastures; but cultivated in several parts, particularly in Essex, for the sake of its fruit. The flowers expand in May and June, and the fruit ripens in August. The root is fusiform; the stem smooth, channelled, branching, and seldom exceeding three feet in height; with smooth, doubly pinnate, incised leaves, the pinnulæ or segments of which are narrow, linear, pointed, and of a deep green colour. The flowers are in numerous, terminal, erect umbels, generally of ten rays, furnished with an involucre consisting of narrow leaflets, solitary, or two to three together, often altogether deficient; and without any partial involucre. The petals of the flowers are five, nearly equal, obtuse, inflective, white, or of a pale blush colour; the filaments slender, rather longer than the petals, and bearing small roundish anthers; and the germen inferior, supporting very short capillary styles with simple stigmas. The fruit is oblong, curved, about one-fourth of an inch in length, of a brownish colour, with five moderately elevated, longitudinal, straw-coloured ridges, the interstices being also obscurely furrowed. Carraway plants do not perfect their fruit until the second year, when they are cut down in July, and the fruit is then thrashed out on a cloth. The fruit, or seeds in familiar language, is used by the London confectioners and bakers, as well as for medicinal purposes.

Qualities. — Carraways are usually mericarps[2], with five light-brown primary ridges, with one vitta in each channel, and two on the commissure. They have a pleasant aromatic odour, and a sweetish, warm, pungent taste, depending on a volatile oil which is almost completely extracted by rectified spirit, and in an inferior degree by water. By distillation with water the whole is elevated, and an insipid extract remains.

Medical properties and uses. — These seeds are carminative and stomachic. They are used in flatulent colic and hysteria; and to give warmth to purgatives and other active remedies.

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[1] Κάστορος ὄρχις Dioscoridis. Careum, non Carum, Latine dici deberet. Conf. *Plin.* l. xix. sect. 49. *Gærtner.*

[2] A *carpel* with half of the calyx attached to it.

The dose in substance is from grs. x. to ʒ ij.

Officinal preparations. — *Oleum Carui*, E. D. *Aqua Carui*, L. D. *Spiritus Carui*, L. E. *Essentia Carui*, D. Carraway Seeds are contained in many other officinal preparations.

CARUI OLEUM, *Lond.* See Part III.

CARYOPHYLLUS. *De Candolle, Prodromus.*

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. Ord.* Myrtaceæ.

G. 972. *Calyx* four-parted, superior. *Petals* four. *Berry* one-celled, one-seeded.

Species 24. C. *aromaticus.*[1] The Clove Tree. *De Candolle, Prod. Syst. Nat. pars* iii. *Hook's Bot. Mag.* 2749, 2750. *Journal de Physique, tom.* xiv. 47. *t.* 1. *Hayne*, x. 38.

Officinal. CARYOPHYLLUM; CARYOPHYLLI OLEUM, *Lond.* The dried unexpanded flowers and oil. Caryophyllus, *Edin. Dub.* The dried undeveloped flowers.

Syn. Cloves: Clous de Girofles (*F.*), Gewürznelken (*G.*), Kruidnagel (*Dutch*), Neliker (*Dan.*), Kryddneglikor (*Swed.*), Gozdz do Potraw (*Pol.*), Gwasditschka (*Russ.*), Clavos de especia (*S.*), Cravo da India (*Port.*), Garofano (*I.*), Kerunful (*Arab.*) Laung (*H.*), Lavanga (*San.*), Craumboo (*Tam.*), Bruah Lawang (*Malay*). *The oil:* Huile de Girofle (*F.*), Nelkenöhl (*G.*), Olio di Girofano (*I.*), Azeyte de Clavos (*S.*), Craumbootylum (*Tam.*), Woorála tail (*Cing.*).

The clove tree is a native of the Moluccas, where it was originally abundantly found, particularly at Machian; but the narrow policy of the Dutch led them to destroy almost all the trees except those which they cultivated on the islands of Amboyna, Honimoa, Oma, and Nousalant, so as to secure a monopoly of the trade, which they held upwards of a century. The French, however, obtained some plants, which they carried to the Isle of France, in 1770; and thence, in 1774, to Cayenne. In 1789 it was also introduced into the island of Dominica, by William Urban Buêe, Esq.; and in 1803, into the island of Sumatra, by Mr. William Roxburgh. At all these places it is now cultivated. It is a handsome tree, rising fifteen to thirty feet, with a stem of very hard wood, covered with a greyish smooth bark. The leaves are ovate-oblong, and pointed at both ends; firm, with many parallel nerves on each side of the midrib; entire, sinuated, and supported on brown petioles, about half the length of the leaf. The colour of the leaf is dull green; and, when bruised, the odour is strong and aromatic. Its flowers are in terminal cymes, which generally consist of 9, 15, or 21 flowers. The calyx is oblong, woody, and divided at the rim into four small-toothed segments. The corolla consists of four rounded, notched, small petals; enclosing many slender filaments inserted into the calyx, bearing simple anthers. The germen is oblong, with a simple style; the fruit is an inferior, coriaceous, bilocular berry.

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[1] Καρυόφυλλα Græcorum.

The clove-tree yields its first crop of cloves at the age of six years; and attains its highest state of bearing at twelve. The existence of this tree is limited to twenty-four years. Although the unopened flowers of this tree, and even the leaves, particularly their petioles, are extremely aromatic and odorous, yet the flowers are inodorous when they are fully blown; and the ripe fruit is not aromatic.[1] The cloves are the unexpanded flowers, which are first obtained when the tree is six years old. At Amboyna they are collected from October to December, when they begin to redden. They require to be dried quickly; on which account they are first immersed in boiling water; then exposed to smoke and a heat of 120° Fahr. till they begin to assume a brown hue; and afterwards the drying is finished in the sun. In the West Indies, those cloves which are dried altogether in the sun are considered the best.

Cloves were first introduced into Europe by the Arabians, who brought them from India. They are imported into this country from the Dutch settlements and the West Indies; the best in casks, and an inferior kind in bags. The oil is brought in bottles; but a considerable quantity is drawn in this country. The best variety of the Amboyna cloves is smaller and blacker than the other varieties: it is very scarce, and as a mark of pre-eminence is named the *Royal* clove. We sometimes find mixed among the best cloves those from which the oil has been drawn; and the fraud is not easily discovered, as the used cloves regain part of their flavour from admixture with good cloves; but they are more shrivelled and less oily, when pressed by the nail, than the unexhausted cloves. The oil is also sometimes adulterated: when it has less of the hot fiery taste, and a less specific gravity, with great depth of colour, it may be suspected.

Qualities.—Good *cloves* have a strong, fragrant odour, and a hot, acrid, aromatic taste, which is very permanent. In form they resemble a small nail, scarcely exceeding half an inch in length; with a roundish conical head, and directly under it four sharp, spreading points, concave above. Their colour is deep reddish brown; the conical part of the head being lighter than the body, and yellowish; and this part is very easily separated. To the touch they feel somewhat greasy; and when pressed with the finger nail they give out oil. Water extracts their odour, but little of their taste: alcohol takes up both; and, when evaporated, the extract is pungent and fiery without any odour. Ether extracts completely their sensible qualities; and when the etherial tincture is evaporated on water, a considerable portion of a very pungent, hot, unctuous resin and some extractive remain. Tromsdorff found that cloves contain 18 *per cent. of volatile oil*, 6 of nearly *tasteless*

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[1] *Journal de Physique*, l. c.

resin, 13 of modified *tannic acid*, 4 of *soluble extractive with tannin*, 13 of *gum*, 18 of *lignin*, and 18 of *water*.

Cloves yield by distillation in water one-sixth of their weight of a heavy, nearly colourless oil, which becomes yellow by age. Its sp. gr. is 1·055. It has the flavour of the cloves, but is comparatively milder. The Dutch oil is deeper, and of a reddish colour; and is extremely pungent and fiery; owing, it is supposed, to its containing in solution some of the resin of the cloves extracted by alcohol.[1] It is violently acted upon by nitric acid, and converted into oxalic acid. It is a compound of a light and a heavy oil. The light oil is a hydro-carbon (C_{10} H_8), identical with oil of lemons. The heavy oil has acid properties, and may be separated from the other by alkalies. Its formula is C_{24} H_{15} O_5. According to M. Lodibert, cloves yield a crystalline principle, which he has named *Caryophillin*. He considers it a subresin, and has found it only in Molucca and Barbadoes cloves; those from Cayenne containing none of it. It is extracted by alcohol; and is a crystalline, odourless, tasteless, volatile matter, insoluble in water, but soluble in ether, alcohol, and the pure alkaline solutions. Sulphuric acid reddens it. It resembles camphor, and its formula is C_{20} H_{16} O_2. Another crystalline body, called *Eugenine*, has been obtained from the aqueous solutions of cloves.

Medical properties and uses. — Cloves are stimulant in a greater degree than any of the other aromatics. They are sometimes given alone in dyspepsia, when it is attended with a very languid state of the circulation, and a sense of coldness in the stomach; and in atonic gout: but they are chiefly used as corrigents to other medicines, and as condiments. The tincture ordered by the French Codex is a useful preparation.[2] The oil is used as a corrigent to griping extracts, and sometimes as a local application in toothache. The dose of powdered cloves may be from grs. v. to grs. x.; that of the oil ♏ ij. to ♏ vj. triturated with sugar, and given as an oleosaccharum.

Officinal preparations.—*Oleum Caryophylli*, E. D. *Infusum Caryophyllorum*, L. E. D. It is contained also in many aromatic infusions, spirits, confections, &c.

CASCARILLA. See *Croton Cascarilla.*

CASSIA. *Spec. Plant. Willd.* ii. 513.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Leguminosæ.

G. 813. *Cal.* five-leaved. *Petals* five. *Anthers* three superior, barren; the three lower ones beaked.

* *Sennas.*

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[1] Vauquelin obtained an oil resembling that of the clove from the leaves of Agathophyllum *Ravensara*.

[2] It is made with ℥ij. of cloves, and ℥viij. of alcohol, 30° Beaumè, digested for six days and filtered.

Sp. 18. C. *fistula.* Purging Cassia. *Med. Bot.* 3*d ed.* 445. *t.* 160. (Conna) *Hort. Malabar, part* i. *p.* 37. fig. 22. *Hayne,* ix. 39.
Sp. 24. C. *Senna.* C. *lanceolata, De Candolle, Prodromus Syst. Nat.* *Hayne,* ix. 41. C. *obovata, Hayne,* ix. 42. C. *elongata, Royle, Bot. Illustr. t.* 37. C. *acutifolia, Delile, Ægypte, t.* 27. *Hayne,* ix. 40. C. *obtusata, Hayne,* ix. 43.

1. Cassia fistula.[1]

Officinal. Cassia, *Lond.* Cassiæ pulpa, *Edin.* The fruit. Cassia pulp.

Syn. Casse (*F.*), Rohrkassie (*G.*), Pypkassie (*Dutch*), Cassievër (*Dan. Swed.*), Polpa di Cassia (*I.*), Cana fistularis (*S.*), Canna fistula (*Port.*), Ameltàs (*H.*), Suvernaca (*San.*), Konnekai (*Tam.*), Khyar Sheber (*Arab.*), Khyar Chirber (*Pers.*), Drangu (*Jav.*), Mentus (*Malay*), Sonali (*Beng.*).

This tree is a native of both the East and West Indies and of Egypt. It rises to the height of forty or fifty feet, with a large trunk, covered with a soft cineritious bark, and is much branched at the top. The leaves are composed of six pair of ovate, pointed, undulated pinnæ, of a pale green colour, with many transverse nerves, and peduncled: the stipules are scarcely apparent. The flowers, which appear in June, are of a golden colour, placed on long, pendent, terminal spikes.[2] The leaves of the calyx are crenated, blunt, and greenish; the petals unequal, spreading, and waved. The three undermost filaments are long and incurved; the others exhibit large anthers, three of which are rostrated, or like the open beak of a bird, at the extremity. The fruit is a long, woody, black-brown pod, a little thicker than the human thumb, and nearly two feet in length, cylindrical, with two longitudinal furrows on one side, and one on the other; and divided into numerous transverse cells, each containing one smooth, oval, yellowish, shining seed, with red lines dividing it longitudinally, imbedded in a soft black pulp.[3]

The pods are said to undergo a kind of fermentation, to prepare them for keeping. Those which are brought to this country come principally from Barbadoes, Carthagena, and Savanilla, packed in casks and cases; but a superior kind is brought from the East Indies, and is easily distinguished by its being smaller, smoother, and by the greater blackness of its pulp, than those from the West Indies and South America. The heaviest pods, and those in which the seeds do not rattle on being shaken, are the best, and contain the greatest quantity of pulp, which is the part used.

Qualities.—The pulp has a reddish black colour, and a slight, rather sickly odour, with a sweet mucilaginous taste. It is viscid;

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[1] Γλυκοκάλαμον Myrepsici, ultimi fere Græcorum medicorum. Chaiarxambar of the Egyptians.—*Prosper Alpinus, de Plantis Ægypti,* cap. ii.

[2] Alpinus says, "Sunt etiam hi valde odorati, præsertimque oriente sole."—*De Plantis Ægypti,* l. c.

[3] *Gærtner de Fruct.* i. 313. t. 147.

almost entirely soluble in water, and partially so in alcohol and sulphuric ether. The watery infusion, which shows a tendency to gelatinize, has, when filtered, a deep brown colour, and yields a precipitate with alcohol, and the solution of the acetate of lead. The alcoholic and etherial tinctures are not affected by the addition of water; although, when they are evaporated, a thin pellicle of resin remains. No alteration is produced on the alcoholic and watery infusion by infusion of galls; solutions of nitrate of silver, or of sulphate of iron; nor by nitric nor sulphuric acids; chlorine throws down a yellow-coloured precipitate, which is insoluble in ether. Hence there is reason for concluding, with Vauquelin, that this pulp contains *sugar, gelatin, vegetable jelly, gluten, gum,* a small portion of *extractive,* and some colouring matter, besides *lignin* and *water.*[1] N. E. Henry gives the following as the constituents of the African cassia: *pulp,* 61·00; *sugar,* 6·75; *gum,* 13·25; *substance resembling tannic acid, gluten,* a trace of *colouring matter,* a trace of *water,* 17·00 = 100·00. The American cassia contains less of the matter resembling *tannic acid* and more of the other components.[2]

Medical properties and uses. — Cassia pulp is gently laxative; but although it is adapted for children and very delicate women, yet it is apt to induce nausea, flatulence, and griping, when taken in doses sufficient for stronger habits. To assist its operation, and prevent the griping, it is usually conjoined with some neutral salt and an aromatic; but it is now rarely prescribed in any case. The dose is ʒ jij. to ℥ j. or more.

Officinal preparations. — *Confectio Cassiæ,* L. *Confectio Sennæ,* L.

2. CASSIA LANCEOLATA. C. ACUTIFOLIA. C. OBOVATA. C. OBTUSATA. C. ELONGATA.

Officinal. SENNA ALEXANDRINA; SENNA INDICA. Alexandrian Senna; Indian Senna, *Lond. Edin.* Alexandrian Senna; Tinnevelly Senna, *Dub.*

Syn. Séné (*F.*), Sennioblätter (*G.*), Sennetblad (*Swed.*), Liscie Senesowe (*Pol.*), Zenne bladen (*Dutch*), Senne (*Dan.*), Sena (*I.*), Senne de Patta (*Port.*), Sen oriental (*Swed.*), Aleksandrieskie list (*Russ.*), Suná (*Arab.*), Suná Mekki (*H.*), Nilaverei (*Tam.*), Sena pat (*Beng.*).

The species of cassia, which yield the senna of commerce, are annual plants, natives of Upper Egypt, Benou in Central Africa, and India. The genus consists of trees, shrubs, and herbaceous plants, with simply and abruptly pinnated *leaves;* formed of opposite leaflets. The *flowers* are papilionaceous, in racemes; they consist of five unequal *sepals,* conjoined at the base; five unequal *petals;* a stalked *ovary;* and a compressed, many seeded *legume.* Much senna grows in the valleys of Nubia[3], where it is named *Abyreyga;* flowering in July and August.

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[1] C. *Nectoux.* Vide *Phil. Mag.* xv. 55.

[2] *Ann. de Chim.* vi. 275.

[3] *Journ de Chim. Méd.* ii. 370.

The *Tripoli senna* consists chiefly of the leaflets of the *C. lanceolata* of Nectoux (the *C. Æthiopica* of Guibourt), which also forms a small portion of that which is termed *Alexandrian senna.* The leaves consist of three to five pairs of oval-lanceolate leaflets, oblique at the base, about nine lines in length, and three to four in breadth, of a yellowish green colour, and having glandiliferous petioles. The fruit is a pale fawn-coloured legume, about fifteen lines long.

The *Alexandrian senna* is chiefly composed of the leaflets of the C. *obovata*, the Sena Belledy of the Egyptians; and a portion of C. *acutifolia*, which is collected in the desert to the south and east of Assouan, and conveyed by the Arabs to Cairo. The *leaflets* of the C. *obovata* are obovate, obtuse, and the petioles free from glands. The *legumes* are curved, plano-compressed, with tumid crests along the middle of each valve. The *leaflets* of C. *acutifolia* are small, lanceolate, and acute; the *legumes* are broad, not curved, but swollen by the seeds, which are six or seven in each legume.

The London College refers the Alexandrian senna to Cassia *officinalis?* (Senna *officinalis*, *Roab*) and to Cassia *obovata*; and the leaf is described as unequal at the base, ovate acute, or obovate mucronate. By the Edinburgh College this kind of senna is stated to consist of the leaves of various species of cassia, probably of Cassia *lanceolata* (*Forskal*), Cassia *acutifolia* (*Delile*), and Cassia *obovata* (*Calloden*), and to be mixed with the leaves of Cynanchum *Argel;* which should be removed as far as possible by picking. The Dublin College refers Alexandrian senna to Cassia *acutifolia* (*Delile*).

The best *East Indian, Tinnevelly*, or *Mecca senna* is composed of the leaflets of C. *elongata.* They are lanceolate, slightly mucronulate, smooth above, downy beneath, with veins running inwards, and forming a flexuose intramarginal line; the *legumes* are oblong, straight, membranous, about one inch and a half long, and five-eighths broad, rounded at the apex, many seeded, and of a deep brown colour.[1]

Senna *Indica*, by the London College, is referred to Cassia *officinalis* (Senna *officinalis*, *Roab*), and the leaves are stated to be unequal at the base and lanceolate: by the Edinburgh and Dublin Colleges it is referred to Cassia *elongata* (*Lemaire—Lisancourt*) Both the ordinary Indian, and the variety called Tinnevelly, are made officinal by the Edinburgh, the Tinnevelly only by the Dublin, College. According to the Edinburgh directions, the leaves should be for the most part large, unbroken, and free from brownness or blackening.

The best Alexandrian senna is named in Nubia *Guebelly*, in Egypt *Sena* of *Seyde.* It grows wild, and yields two crops of leaves, the abundance of which depends on the periodical rains.

[1] *Lindley, Flora Med.* 258.

The first crop is collected after the first rains, about the middle of September; the second, in the following March, at which time the fruit is at its full maturity. The plants are cut when the flowers begin to fall, and exposed on the rocks to dry in the sun. This variety is partly the product of Cassia *acutifolia*: it is chiefly collected in a valley called Bicharie, near Syène, in Abyssinia, whence it is sent to Esneh. The second variety, the product of Cassia *obovata*, which is found chiefly in Upper Egypt, and is less purgative than the former, is sent to Assouan.[1] The leaflets after being dried are picked, then packed up in bales, and sent to Boulal, the great entrepôt of senna[2], where they are mixed with another species of cassia, the C. *lanceolata* of Forskal, and also with the leaf of the Cynanchum *oleæfolium*, known in Egypt by the name of Argel or Arguel, and the leaflets of Tephrosia *Apollinea*. The proportions, according to Dr. Calloden, are 500 parts of acute-leafed senna, 300 of obovate senna, and 200 of argel. Rouillure states this proportion to be 7000 to 8000 parts of acute-leaved senna, 2500 to 2900 of obovate, 2000 of Ethiopic, and 2000 to 2400 of argel. The two first admixtures are nearly equally good as the other senna, but the two last are truly adulterations. They can be readily distinguished by attending to the following rules:

1. The leaf of argel (*see fig. e, cut* p. 215.) is an inch or fourteen lines long, while that of the leaflets of Senna *acutifolia* never exceeds nine lines. 2. The leaf of argel is warty, and the lateral nerves are imperfectly seen on the under disk, while those of the leaflets of senna are conspicuous. 3. The leaf of argel is regular at its base, the two sides terminating at the same point on the petiole; but the senna leaflets are oblique, one of the sides being larger, and produced lower on the petiole, than the other.[3] The leaflets of Tephrosia *Apollinea* (*see fig. d, cut* p. 215.) are obovate, somewhat cuneiform, emarginate, and nearly equal sided; the lateral nerves are parallel, and oblique to the midrib; the legume (*fig. i*) is long, narrow, linear, somewhat ensiform, and contains six or seven brown seeds. There is also reason for thinking that it is occasionally further adulterated with the leaflets of Colutea *arborescens*, bladder senna, and the leaves of Coriaria *myrtifolia* (*fig. f*) and of box, Buxus *sempervirens*; but these are easily distinguished from senna leaflets. The senna, after being thus mixed, is repacked in bales at Alexandria, whence it is exported to Europe.[4]

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[1] Burckhardt says that the Bedouin Arabs, who are the chief collectors of senna, sell it to the merchants of Esne at about one pound sterling per camel load (from 400 to 500 weight).—*Travels in Nubia*, 4to. p. 31.

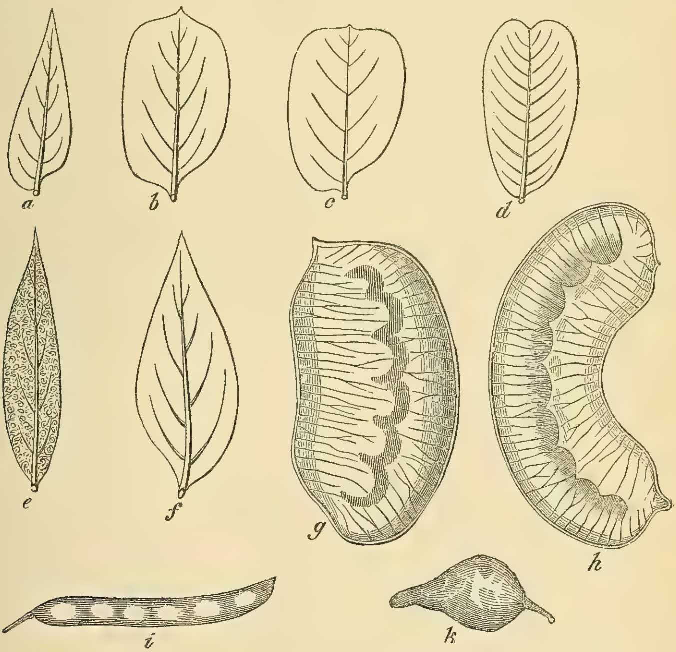
[2] Dr. Falconer found Cassia *obovata* in the salt hills near Cohaut in Cashmeer, and also near Delhi.—*Proceedings of the Linn. Soc.* Feb. 1839.

[3] *Hist. Nat. et Méd. des Casses, &c.* Par L. T. Fred. Calloden, de Génève, M. D. 4to. Planches. Montpelier, 1816.

[4] Nectoux says, that the palthier, or senna manager of Alexandria, acknowledged that the product of the two crops varies from 700 quintals to 1,100 or more, one-third

A great deal of senna is imported from Madras and Bombay, under the name of East Indian senna. It is, as already stated, the leaflets of Cassia *elongata*[1]: it was formerly taken to India from the Persian Gulf, and was the growth of Mekka; but much of it is now cultivated at Tinnevelly, on the Malabar coast. Besides these adulterations, the Alexandrian senna contains a large quantity of the pods of the cassias of which it is composed. Neither the leaflets of Colutea *arborescens,* nor the leaves of Coriaria *myrtifolia,* are common in the senna imported into this country. There are three varieties of senna found in our market:—namely, *Alexandrian, Tripoli,* and *East Indian.*

1. *Alexandrian senna* arrives in bales and barrels. It is a mixture of the leaflets of C. *acutifolia* (*a*), and its pod (*g*); C. *obtusata* (*b*); C. *obovata* (*c*), and its pod (*h*); the leaves of Cynanchum *olæfolium* (*e*), and its pod (*k*); and occasionally of the leaves; of Tephrosia *apollinea* (*d*), and its pod (*i*), with the leaves



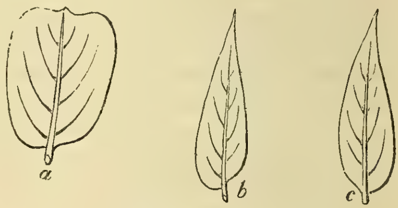
Alexandrian Senna.

of which is *argel,* and the sale is 1,400 or 1,500 quintals (more probably from 1,500 to 1,600).—*Phil. Mag.* i. c. Burckhardt says, that for many years the senna trade has been exclusively in one hand, being farmed by Mohammed Aly; and that "M. Rosetti has paid for the monopoly of senna 150 purses per annum, or about 3,500*l.*"—*Travels in Nubia,* 4to. 1819, p. 53.

[1] The Cassia *Marilandica,* a native of the United States of America, is a variety of C. *elongata.*

of Coriaria *myrtifolia* (*f*). Although the leaflets are more broken, and it contains more adulterations than any of the other varities, yet it is the most esteemed. Besides the pods and leaf-stalks already noticed, the flowers of the cassias are also found in it; and it is the only senna in which argel and tephrosia are mixed. The wholesale druggists separate the pods and stalks, and sift out the small and broken leaflets: it is then sold at a high price, as *Picked Alexandrian Senna,* or *Senna electa:* but it still contains the leaves of argel: and the siftings, being free from them, are preferable to the *Senna electa.* This senna has a greyish green colour, and an odour not unlike that of hyson tea.

2. *Tripoli senna* contains none of the argel nor tephrosia; but it resembles the Alexandrian in other respects. It consists chiefly of the leaflets of C. *obtusata* (*a*); C. *acutifolia* (*b*); and C. *lanceolata* (*c*). The leaflets are usually more broken down than those of Alexandrian senna.



Tripoli Senna.

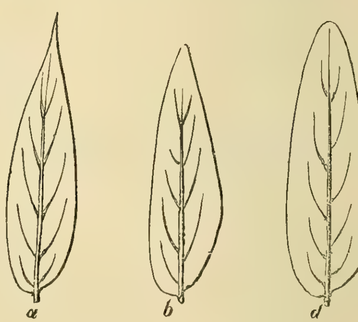
3. The *East Indian senna* comprehends three varieties, namely, *Bombay, Madras,* and *Tinnevelly senna.*

a. The Bombay senna is only exported from that part of India, to which it is carried from the neighbourhood of Mocha, and other parts of Arabia. It consists chiefly of C. *lanceolata* of Forskahl. Many of the leaflets have a damaged and withered appearance, owing to carelessness in curing it. A small quantity, "in good condition, has been imported from Turkey, in casks."[1]

b. The Madras senna consists of larger leaflets than the Bombay: it is more esteemed than the latter.

c. The Tinnevelly senna is superior to the two foregoing varieties of East Indian senna. It is perfectly free from all adulterations; and consists of the entire leaflets of C. *elongata* (*fig. a b d*), which are of a pale green colour, thin, flexible, and from an inch to two inches long, and nearly half an inch broad.

It is called Sena Mekki and Tinnevelly senna, in the Indian bazaars.



East Indian Senna.

[1] *Pereira's Elements,* p. 1663. 2d edit.

Qualities. — The odour of senna is faint, rather disagreeable, and sickly; the taste slightly bitter, aromatic, sweetish, and nauseous. Boiling water extracts about one third of the weight of the leaflets employed; a pint of the water is requisite to extract all the active matter from ℥j. of senna. The infusion has a deep reddish brown colour, with the odour and taste of the leaves. This infusion, when exposed to the atmosphere, deposits a lemon-yellow coloured, insoluble matter; and a precipitate is produced by the strong mineral acids, oxalic acid, the carbonates of the alkalies, lime-water, diacetate and acetate of lead, nitrate of silver, sulphate of iron, chloride of barium, and several other substances. Cold water extracts all the soluble matter of senna, and affords an infusion which operates well without griping. Alcohol and sulphuric ether, digested on the powdered leaflets, acquire a deep olive-green colour. When the etherial tincture is poured on the surface of pure water, a dark olive pellicle remains after the evaporation of the ether, which is almost insipid, and has all the properties of resin; and a golden-yellow colour is communicated to the water.[1] The alcoholic tincture is rendered only slightly milky by the addition of water, and scarcely any precipitate is produced; but a copious one is thrown down by chlorine. The active principle of senna, according to the experiments of MM. Lassaigne and Fenuelle, is a substance which they have named *Cathartine.* It is uncrystallizable, and, as usually obtained, of a reddish yellow colour, deliquescent, with a peculiar odour, and bitter nauseous taste. It is soluble in alcohol and in water, but insoluble in ether.[2] Its watery solution is precipitated by infusion of galls, and the solution of the diacetate of lead; but not by the acetate of lead, tartar emetic, gelatin, iodine, nor the alkalies, although the latter deepen its colour. The other components are *yellow colouring matter, volatile oil, fixed oil, albumen, gum, malates of potassa,* and *tartrates of lime, mineral salts, acetate of potassa,* and *lignin.*[3] According to Bouillon Lagrange, the residue of the watery infusion, evaporated to dryness and burnt, yields potassa, sulphate of potassa, carbonate of lime, magnesia, and silica.

Medical properties and uses.— Senna is purgative, generally operating under four hours after it is taken. It is well adapted for all

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[1] This colour may be produced by some extractive being taken up by the ether, closely united to the resin.

[2] *Ann. de Chim. et Phys.* xvi. 20. Cathartine is obtained by precipitating a filtered decoction of senna by acetate of lead; and passing through the decanted fluid sulphuretted hydrogen gas. The fluid is next evaporated to dryness, the extract digested in alcohol, and the alcoholic solution evaporated to dryness. This result is to be digested in alcohol acidulated with sulphuric acid, the effect of which is to throw down an insoluble sulphate of potassa, which must be separated by the filter. Any excess of sulphuric acid in the fluid must be precipitated by acetate of lead, after which sulphuretted hydrogen is to be passed through the fluid, and this, being filtered and evaporated to dryness, is the cathartine.

[3] *Ann. de Chim. et Phys.* xvi. 16.

cases in which the bowels require to be certainly, yet moderately, evacuated. Its action seems to be chiefly on the small intestines, and not accompanied with much depression of the system. In many habits it is apt to occasion griping, and, therefore, it requires the addition of some aromatic, such as carraway or cardamom seeds, or ginger; and its operation to be assisted by drinking plentifully of weak broths or gruel. The griping seems to be occasioned by the resinous matter, as the infusion made with cold water does not gripe so much as that made with hot, although it purges equally well. Its purgative powers are augmented by camphor and decoction of guaiacum. It is improper in cases where the mucous membrane is in an irritable or inflamed condition; and it is also found to prove hurtful when hæmorrhoids are present. Senna may be given in substance powdered; but the more usual form is that of infusion. Boiling appears to lessen the activity of senna, hence the decoction is a bad form for administration. The dose of the powder of the leaves is from ℈j. to ʒj; but it is seldom given alone. The Alexandrian senna, until very recently, was that most esteemed in this country, but now the Indian senna is considered by most practitioners who have tried the relative powers of the different sennas, to be at least equal, if not superior, to the rest, and it has the advantage of not being liable to adulteration.

The cathartine of MM. Lassaigne and Fenuelle is thought by Dr. Christison not to be the active principle of the drug.

Officinal preparations.—*Confectio Sennæ*, L. D. *Electuarium Sennæ*, E. *Infusum Sennæ compositum*, L. E. D. *Infusum Sennæ*, E. *Tinctura Sennæ composita*, L. E. D. *Syrupus Sennæ*, L. E.

CASSIÆ (LAURUS). Cortex et Oleum. See *Laurus.*

CASTOR. *Syst. Nat. Gmelin.* 124.

D. 1. Mammalia. *Ord.* 4. Rodentia. *Cuvier.*

G. 23. *Fore-teeth* in the upper jaw truncated, hollowed with a transverse angle; in the lower, transverse at the point. *Grinders* in both jaws, four. *Tail* long, depressed, flat, horizontal, scaly. *Clavicles* perfect.

Species 1. C. *Fiber.* The Beaver. *Jonst. Quadr.* p. 147. *t.* 68. *Buffon*, viii. xxxii. *Cuvier, Règ. Animal*, vol. i. p. 190.

Officinal. CASTOREUM[1], *Lond. Edin. Dub.* Castor, Russian and Canadian.

Syn. Castoreum (*F.*), Kastoreunt, das Bibergeil (*G.*), Bevergeil (*Dutch*), Baevergeel (*Dan.*), Bäfvergall (*Swed.*), Stroy Bobrowy (*Pol.*), Castorio (*I.*), Castoreos (*S.*), Castoreo (*Port.*), Ash batchegan (*A.*), Goond beyduster (*Pers.*), Beuer, Bever (*old Scotch*), Los Lydan (*Gælic*), Afange (*Welch*).

The beaver is an amphibious quadruped, found in the northern parts of Europe, Asia, and America[2], inhabiting the wooded unin-

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[1] Κάρος Dioscoridis. The ancients erroneously believed that the castor follicles were the testicles of the beaver.

[2] It has been asserted that the beaver is found also in Africa; yet naturalists have not been able to find more than one species. It was formerly found in Wales, in the

habited banks of deep rivers and lakes, in which situations it is gregarious, and constructs its habitation with greater skill than any other animal except man. The hut, if it may be so named, serves for more than one family, and consists of two stories, the upper one for the animals, and the lower for the provisions. The body is thick, about two and a half feet in length, and covered with short, iron-brown and chestnut-coloured hair: the feet are five-toed, and the hind ones webbed: the eyes small, round, and so acutely sensible of light as to remain open only in dull weather; and the ears short, hairy, and so formed that the meatus is closely shut, when the animal plunges into and remains beneath the water. The tail is grey, about half the length of the body, flat, horizontal, scaly, with that part only of it which is next to the body covered with hairs. Between the anus and the external genitals in each sex are four follicles, of an oblong shape, smaller above and large, below; the two smaller are filled with a fatty matter, the two larger contain each about two ounces of an oily, viscid, strong-smelling substance, enclosed in membranous cells, which is the *officinal castor.*[1]

When the beaver is taken, the follicles are cut off entire, and dried, either by exposure to the sun or in smoke. The castor is at first nearly fluid, but gradually becomes solid and viscid, occasionally perfectly dry and pulverulent. The best comes from Russia; but of late years Russian castor has been very scarce, and all that is now found in the shops is the produce of Canada. The follicles of the *Russian castor* are large, dry, roundish, heavy, and solid, appearing, when cut, of a reddish or ash-brown colour; those of the *Canadian* are smaller, hard, oblong, thin, and corrugated on the outside. The Canadian castor, when treated with ammonia, affords an orange-coloured product; the Russian a white. In each beaver there is a large and a small bag, and the castor in the larger bag is always the best. The goodness of the castor is determined by its sensible qualities; that which is quite black is insipid, inodorous, oily, and unfit for use. Castor is said to be sometimes counterfeited by a mixture of some gummy and resinous substances with a little real castor, artificially interspersed with membranes, and stuffed into the scrotum of the goat.[2] The fraud is easily detected by comparing the smell and taste with those of real castor, and by the deficiency of the sebaceous follicles, which are always attached to the real follicles.

Qualities. — The odour of castor is strong, heavy, and aromatic;

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river Teivi. Giraldus Cambrensis mentions it in 1188. Sibbald has the following sentence, "Boethius dicit fibrum seu castorem in Scotia reperiri." — *Prod.* p. ii. l. 3. p. 10.

[1] It is asserted that the European and the American beavers are distinct species: the former burrows, the latter builds. — *Pereira.*

[2] *Duncan's New Edinburgh Dispensatory*, 5th edit. p. 220.

the taste bitter, sub-acrid, and nauseous. It feels slightly unctuous, and is of a red-brown colour. Its odorous principle is dissipated by coction with water; but when it is simply infused in boiling water, its sensible qualities are in a small degree imparted to the infusion, which has a yellow colour, and shows the presence of an alkali, by changing to green the vegetable blues. Alcohol and sulphuric ether dissolve the resinous part of the castor, which remains after the evaporation of the menstrua, and retains all the odour and taste of the drug. According to the analysis of Bouillon Lagrange, Russian castor contains the *carbonates of potassa*, of *lime*, and of *ammonia*, *iron*, *resin*, a *mucilaginous extractive matter*, and a *volatile oil*; Canadian castor contains the same, with *benzoic acid*, both free and combined.[1] Bonn, who examined Russian castor, found in it a *volatile oil*, *adipocire*, *resin*, and *lime*.[2] M. Brandes found in it a peculiar principle which he termed *Castorine*; which crystallizes in long, semi-transparent, white prisms, with the smell of castor, and having a coppery taste; insoluble in cold water and cold alcohol, but soluble in boiling alcohol and in the volatile oils. It is procured by boiling castor in alcohol: the castorine precipitates as the solution cools. The resin which he procured was dark brown, acrid, bitter; insoluble in ether, but soluble in alcohol.[3] Castor also contains an oily acid, named carbolic acid.

Medical properties and uses. — Castor is antispasmodic, and emmenagogue. It was formerly given in combination with myrrh as a specific in quartans[4]; and is still prescribed, with seeming advantage, in low nervous fevers, hysteria, epilepsy, and spasmodic affections: and from the idea of its action being particularly determined to the uterine system, it is supposed to prove useful in amenorrhœa and chlorosis. Castor is exhibited either in powder or in tincture; but it is now seldom ordered; and the Materia Medica certainly contains many better antispasmodics. But both Dr. Alexander and M. Iorg, as well as his pupils, found no decided effects follow the administration of large doses of it.

The dose of powdered castor is grs. x. to ℈j., given as a bolus.

Officinal preparations. — *Tinctura Castorei*, L. E. *Tinctura Castorei Ammoniata*, E.

CATECHU. See *Acacia*.

CENTAURIUM. See *Erythræa Centaurium*.

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[1] *Laugier, Ann. de Mus. d'Hist. Nat.* t. ix. p. 323.

[2] *Bonn, Anatomia Castoris atque Chemica Castorei Analysis*, 1806.

[3] Brandes procured from Russian castor 2·0 of *volatile oil*, 58·6 *resin*, 1·2 *cholesterine*, 2·5 *castorine*, 1·6 *albumen*, 10·4 *gelatine*, 2·4 *osmazome*, 1·6 *matter soluble in alcohol*, 2·6 *carbonate of lime*, 2·4 *other salts*, 14·7 *membrane*, *&c.* = 100·0. From Canadian he obtained 1·0 *volatile oil*, 13·85 *resin*, 0·33 *castorine*, 0·05 *albumen*, 0·20 *osmazome*, 33·62 *carbonate of lime*, 2·82 *other salts*, 2·30 *mucus*, 2·30 *animal matters like horn*, 44·83 *membrane*, *&c.* = 100·0. — *Handb. d. Chim.* ii. 14. 491.

[4] *Sennertus de Febribus*, lib. ii. cap. 20.

CEPHAELIS. *Spec. Plant. Willd.* i. 977.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Cinchonaceæ.

G. 357. *Flowers* in an involucred head. *Corolla* tubular. *Stigma* two-parted. *Berry* two-seeded. *Receptacle* chaffy.

Species nova. Cephaëlis *Ipecacuanha.*[1] Ipecacuan, *Woodville's Med. Bot. 3d edit. vol.* v. *t.* 11. *Linn. Soc. Trans.* vi. *p.* 137. *t.* 2. *De Candolle, Prodromus. Martin's Sp. Mat. Med. Brazil. Hayne,* viii. 20.

Officinal. IPECACUANHÆ RADIX, *Lond. Edin. Dub.* The root of Ipecacuan.

Syn. Ipecacuanne (*F.*), Brechwurzel (*G.*), Kräkrot (*Swed.*), Americansk Bräkrod (*Dan.*), Ipecaquana (*I.*), Ipecacuanha o Bejuquillo (*S.*), Cipo (*Port.*), Ipecacuanna (*Dutch*), Rvotnoi koven (*Russ.*).

This plant is a perennial, found growing in shadowy moist situations, in the forests of the provinces of Pernambuqua, Bahia, Rio Janeiro, Paulensia, Mariannia, and other provinces of the Brazils; flowering in December, January, February, and March; and ripening its berries in May. The root is simple, or somewhat branched, and furnished here and there with short radicles: it is roundish, three to seven inches in length, and two or three lines in thickness; bent in different directions, externally brown, and annulated with prominent, unequal, roughish rings. The stem is procumbent at the base, rising from five to nine inches in height, round, the thickness of a hen's quill; smooth, brown, leafless, and knotted in the lower part, but leafy towards the apex. The inferior leaves are caducous, so that a few only remain at the summit of each stem when it flowers; they are almost sessile, opposite, spreading, ovate, pointed at both ends; of a deep green colour on the upper surface, and of a whitish green, downy, and veined on the under. At the base of each pair of leaves are sessile, fimbriated, short, withering stipules, embracing the stem. The flowers are aggregated in a solitary head, terminating the stem, and encompassed by a four-leaved involucre. The florets are sessile, from fifteen to twenty-four in number, interspersed with scaly bracts: the calyx is small, five-toothed, superior, persistent: the corolla monopetalous, the expansion divided into five ovate, acute, recurved segments: the filaments are short, capillary, inserted in the upper part of the tube, and bearing long erect anthers: the germen is inferior, with a simple style, a bifid stigma. The fruit is a soft reddish purple berry, changing to black, containing two oval seeds.

According to De Candolle, the term Ipecacuanha in South America implies generally *vomiting root;* and therefore, he says, it is applied to the roots of very different species of plants: but the Indians give the name *Poaya* to all emetic roots. The name

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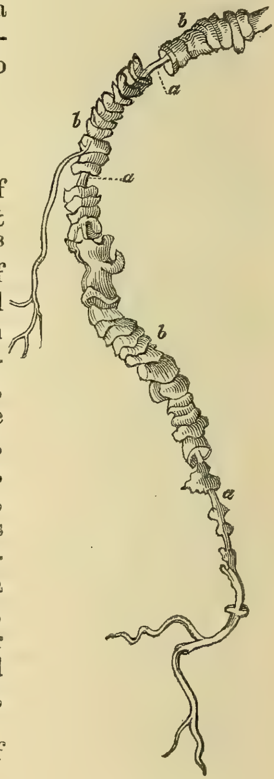
[1] As Willdenow, following Swartz, has united the genus *Callicocca* with that of *Cephaëlis,* we have referred the Ipecacuanha to this genus.

Ipecacuanha is derived from *Epi*, root, and *Cacuanha*, the name of the place where it is most abundantly found. The Cephaëlis, however, which we have described from Professor Brotero's paper, published in the sixth volume of the *Linnæan Transactions*[1], and the Psychotria *emetica*, which Mutis says yields the Peruvian grey ipecacuanha, are the plants that yield the varieties of the root brought to this country.[2] I have found very little of the white ipecacuanha, which is the root of the Richardsonia *emetica*, in any of the specimens of the ipecacuanha of the shops which I have examined. Ipecacuanha may be regarded as belonging to one or other of the following divisions:—



1. *Annulated Ipecacuanha.*
2 *Striated Ipecacuanha.*

1. Annulated Ipecacuanha is the root of Cephaëlis *Ipecacuanha*. Two varieties of it are found in the market—*grey* and *brown*.[3] Both the grey and the brown varieties of the root are brought to this country packed in bales from Rio Janeiro. Both are, in short, wrinkled, variously bent, and contorted pieces, from three to six inches long, which break with a resinous fracture. The grey is about the thickness of a small quill, full of knots, *b*, and deep circular fissures, that nearly reach down to a white, woody, vascular cord, or meditullium, *a*, that runs through the heart of each piece; the external part is compact, brittle, and of a greyish black colour; the brown is smaller, more wrinkled, of a blackish brown colour on the outside, and whitish, horny, and translucent within: the white is woody, and has no wrinkles.

2. Striated Ipecacuanha is the root of

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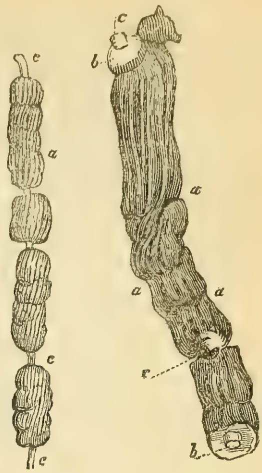
[1] Brotero described it under the name of Callicocca *Ipecacuanha;* but the name of the genus was altered by Tussac. It was previously described by Gomez of Lisbon, in 1801.

[2] The title of ipecacuan or poaya is generally given to the roots of the following plants, besides those mentioned above, in South America: Viola *parviflora*, V. *Ipecacuanha*, V. *calceolaria*, Cynanchum *Ipecacuanha*, C. *tomentosum*, and Asclepias *curassavica;* and according to M. Martius, to Richardsonia *scabra*, R. *emetica*, Polygala *Poaya*, Ionidium *Ipecacuanha*, I. *brevicaule*, I. *urticæfolium*, Chiococca *anguifuga*, C. *densifolia*, Manettia *cordifolia;* and sometimes to Euphorbia *Ipecacuanha*, Dorstenia *Brasiliensis*, and D. *arifolia*.

In St. Domingo, several species of Ruellia, which provoke vomiting, are named false ipecacuan.—*Nouveau Dictionnaire d'Histoire Naturelle*, art. *Ipecacuanha*.

[3] Guibourt mentions a greyish-white.



Psychotria emetica. Instead of the ringed knots it presents strangulations, *a*, with the pieces striated. The cuticle has a reddish brown colour, and the woody axis, *c*, is white.

This root breaks with a starchy fracture; is slightly bitter, and has scarcely any odour. It contains only a very small amount of *Emetina*[1], the emetic principle of ipecacuanha.

In choosing ipecacuanha, the larger roots, which are compact, and break with a resinous fracture, having a whitish grey, somewhat semitransparent appearance in the inside of the cortical part, with a pale straw-coloured medullary fibre, are to be preferred. The powder should be greyish yellow.

Qualities.—The entire root is inodorous, but the powder has a faint, musty, disagreeable odour. The taste is bitter, sub-acrid, and extremely nauseous. Water at 212° takes up about 40 per cent., alcohol takes up 20 per cent., and proof spirit six and a half. The alcoholic is more emetic than the aqueous solution. Various analysis of ipecacuanha have been made in order to detect its emetic principle; but the most satisfactory is that of M.M. Pelletier and Dumas, an account of which was first published in 1817.[2] They found the cortical part to consist of 2 per cent., of concrete *odorous oil*, 6 of *wax*, 10 of *gum*, 42 *fecula*, 16 *emetina*, and 20 *lignin*. The woody cord contained 1 per cent. only of *emetina*.[3] Pelletier's *Emetina* was very impure, and in the form of a deliquescent extract. He afterwards found only 1 per cent. of the white *emetina*. After digesting the powdered root in double its weight of ether, in order to separate any fatty matter, the remainder was treated with four times its weight of highly rectified alcohol, until it ceased to become coloured even when aided by heat. These tinctures, after being allowed to cool, and to deposit some flakes of wax which were separated by filtration, were then evaporated to dryness, and the residue re-dissolved in cold distilled water. Magnesia was next added to the watery infusion, to separate any acid it might contain: the mixture was then filtered and evaporated; and the *emetina* being insoluble was precipitated with the magnesia. The precipitate being washed with cold water and digested in alcohol, the *emetina* was taken up, and by evaporating the solution was procured. *Emetina*, when

[1] The name is derived from εμεω, vomo.

[2] Vide *Ann. de Chim. et de Phys.* iv. p. 172., and *Lond. Med. Rep.* vol. viii. p. 252.; also *Dictionnaire de Drogues*, t. iii. p. 261.

[3] *Buchner, Repert.* vol. iii.

pure, is a whitish yellow, inodorous, slightly bitter, powder, uncrystallizable but persistent in the air: it is often in reddish brown coloured, semitransparent scales. It is sparingly soluble in cold water, and when pure does not deliquesce in a moist atmosphere, although it does so when in the coloured state. It is soluble in alcohol, but not in ether. Its solutions have an alkaline reaction. It is precipitated from its solutions by tannic acid, consequently all astringent infusions or decoctions. Its formula is $C_{35} H_{25} N_1 O_9$; it possesses all the properties of an alkaloid.

The medicinal value of ipecacuanha depends, undoubtedly, on the quantity of emetina it contains; and this varies in the three varieties of the root found in the shops. MM. Majendie and Pelletier obtained 16 parts of it in 100 of the cortical part of ipecacuanha, the root of Cephaëlis *Ipecacuanha*[1]; 14 in 100 of the red annulated variety; 9 in 100 of the striated ipecacuanha, the root of the Psychotria *emetica;* and 5 only in 100 of a white ipecacuanha, the root of the Viola *emetica.*[2] Very impure emetina is here meant. The woody pith even of the brown variety contains only 1·7 per cent. of emetina, and hence it should be separated in reducing the root to the form of powder.

Experiments made with emetina on animals prove that it is emetic and purgative, in doses of half a grain when pure; and that it exerts a specific action on the lungs and mucous membrane of the intestinal canal, and has also narcotic properties: it may be employed instead of ipecacuanha in every case in which this medicine is useful, the dose being more easily regulated, and the effects more certain: but the nausea which it causes continues longer than that of ipecacuanha. When taken in an over-dose, its further action can be instantly paralysed by decoction of galls.

Ipecacuanha root has been recently examined at Prague by M. E. Willigk, who has found in it *emetina*, a peculiar acid (*Ipecacuanha acid*), traces of volatile oil and fat, besides gum, starch, pectin, and woody fibre. The acid, formerly thought by Pelletier to be gallic acid, is stated to have a composition represented by the formula $C_{14} H_8 O_6$, and to be one of a series of acids found in plants belonging to the order *Rubiacea* or *Cinchonacea*, thus Catechin or Catachuic acid, from

Nauclea Gambir - - -	$C_{14} H_8 O_9$
Kinic acid (in lead salt) - -	$C_{14} H_8 O_8$
Caffeo-tannic acid (dried at 100°)	$C_{14} H_8 O_7$
Ipecacuanha acid (anhydrous) -	$C_{14} H_8 O_6$

[1] The components procured from 100 parts of brown ipecacuanha were as follow: of fatty and oily matter, 2; emetic matter (emetina), 16; wax, 6; gum, 10; starch, 42; and ligneous matter, 20; the remaining four parts being regarded as loss.

100 parts of the red variety yielded, of fatty matter, 2; emetina, 14; gum, 16; starch, 18; woody matter, 48; with merely a trace of wax, and two of loss.

[2] From 100 parts of the white ipecacuanha were obtained, of emetina, 5; gum, 35; vegeto-animal matter, 1; and woody matter, 57; besides three of loss.

The powder of ipecacuanha is apt to become inert by keeping: and therefore it should be preserved in small phials, well corked, and not exposed to the light. Long-continued boiling also renders it inert.

Adulterations. — Ipecacuanha is seldom adulterated in this country. I have occasionally met with roots of Psychotria *emetica;* and also those of Cuchunchully de Cuença, Ionidium *parviflorum,* which resembles the true root, except in the annular character.[1] The roots of undulated ipecacuanha, Richardsonia *Brasiliensis,* closely resemble true ipecacuanha, but they possess no bitterness, and the meditullium is thick; it contains, however, about 6 per cent. of impure emetina, involved in much starch.

Medical properties and uses.—Ipecacuanha, when administered in large doses, is emetic; in smaller doses, diaphoretic and expectorant; and in still smaller doses, it acts as a stomachic, stimulating and giving energy to the digestive organs.

It is impossible to ascertain at what period the effects of this root were first known in America, where the Indians used it as an emetic before their connection with Europeans; but although Piso described its uses fully in his Natural History of Brazil so early as 1618, and brought the root to Europe, yet it was scarcely used by Europeans before the year 1700. It was carried to France by a French physician of the name of Le Gras, in 1672; but it did not attract general attention until it was, a third time, introduced by a French merchant of the name of Grenier, who brought 150lbs. of it from Spain in 1686, with which trials were made at the Hôtel Dieu. John Helvetius, grandfather of the celebrated Helvetius, first made known its use in dysentery, and was rewarded by Louis XIV. with 1000*l.* sterling and public honours for the discovery, and for making it public.

As an emetic, it is mild, safe, and certain in its operation; it is, however, a mistake that, when given in larger doses than are necessary, it does not operate more violently, but only in a shorter space of time: on the contrary, it operates as an acro-narcotic poison, and terminates in coma and death. It does not act so quickly as many other emetic substances; but it evacuates completely the contents of the stomach, and does not so much weaken the organ as antimonial emetics. It is given at the commencement of continued fevers, the progress of which is sometimes cut short by its operation; and it is also frequently found to stop the paroxysm of an intermittent, when given immediately before the accession of the cold stage. At the commencement of inflammation of the pharynx, larynx, and trachea, when the inflammation does not run very high, in cynanche tonsillaris, purulent ophthalmia, abscess, and

[1] It is employed as a remedy for elephantiasis in Venezuela.—*Med. Bot. Trans.* 1840.

every case in which it is necessary to evacuate the stomach, or to increase the energy of the absorbent system by full vomiting, ipecacuanha has been found useful.[1] Its active principle is separated by the digestive function; consequently it requires time, and does not operate until that principle enters the circulation, which is usually from fifteen to twenty minutes after the powder has been swallowed. It gives a powerful concussion to the system, and is therefore preferred to other emetics for checking the paroxysm of ague. In doses sufficient to excite nausea without producing vomiting, ipecacuanha is given with excellent effects in dysentery[2], and obstinate diarrhœa, in which cases its efficacy seems to arise in a great degree from the nausea, which is kept up by the repetition of the small doses, diminishing the arterial excitement, and determining to the surface; and partly so, as Cullen supposed, from its producing a steady determination of the peristaltic motion of the intestines downwards.[3] Perhaps, also, to these first-mentioned effects of the nausea may be attributed much of the benefit which results from the use of ipecacuanha in spasmodic asthma, dyspnœa, pertussis, and epilepsy. In the first of these diseases its emetic power is taken advantage of to relieve the paroxysm, after which it is given in repeated small doses to prevent its return.[4] In nauseating doses also, owing to the nausea lessening the force of the circulation, it has been employed with the best success in uterine and pulmonary hæmorrhages. As a sudorific, it is used in acute rheumatism, arthritic affections, dropsy, and other diseases in which sweating is necessary. It is generally given in these cases in combination with opium and neutral salts, according to the mode introduced by Dr. Dover. (See *Pulvis Ipecacuanhæ compositus.*) But we have found it in combination with opium alone in a larger proportion more efficacious, particularly in rheumatism. Its expectorant powers have been found exceedingly useful in catarrhal affections, pneumonia after bleeding, and in the early stage of phthisis, in which its diaphoretic effect is not injurious, as in the latter stage of that disease. In all these affections its powers are increased by the addition of opium.

The emetic operation of ipecacuanha is quickened by combining it with tartar emetic; and, on the contrary, it is moderated by opium, and greatly by extract of gentian; and destroyed by vegetable infusions containing tannic acid. Opium, however, is rendered less narcotic when combined with ipecacuanha, although its power of allaying pain is not diminished, while the sudorific effect of the ipecacuanha is much augmented by the combination. We do not,

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[1] Dr. Robert Dick, of Glasgow, informs us that ipecacuanha is an excellent emetic for leeches; it does not injure them like salt or vinegar. It should be sprinkled on the back of the leech.

[2] *Piso, Helvitius, Cleghorn, Pringle.*

[3] *Materia Med.* ii. 477.

[4] *Akenside.*

however, agree in opinion with those who think that it is to be relied on as an antidote against the deleterious effects of opium; its emetic influence being too slowly exerted, and checked by the opium. The emetic influence of gr. v. of ipecacuanha can be completely checked by twelve grains of extract of gentian. The infusion of nutgalls is the only certain and powerful antidote for an over dose of ipecacuanha, instantly rendering it inert.

Idiosyncrasy occasions some persons to be affected with the most distressing sensation of suffocation, and others suffer from violent sneezing, by the effluvia of this root.

Ipecacuanha is exhibited in substance, or as powder, and in aqueous and vinous infusions; and also as a syrup for children.[1] The dose of the powder, to produce full vomiting, is from grs. xx. to ʒ ss.; and of the aqueous infusion, which is made by macerating for an hour ʒ ij. of the powdered root in f ℥ vj. of boiling water, and filtering, f ℥ j. or f ℥ jss. may be given every half hour till vomiting is excited. The emetic effect is continued, and rendered easier to the patient, by drinking, in the intervals of vomiting, large draughts of tepid water. For producing the other effects of ipecacuanha, it is given in doses of one, two, or three grains, generally in the form of pills, repeated every four or five hours: but although its sudorific effect, when begun, is aided and kept up by the use of warm fluids, yet these must not be drunk soon after the dose has been taken.

Officinal preparations.—*Pulvis Ipecacuanhæ compositus*, L. E. D. *Pilulæ Conii compositæ*, L. *Pilulæ Ipecacuanhæ cum Scillâ*, L. *Pilulæ Ipecacuanhæ et Opii*, E. *Vinum Ipecacuanhæ*, L. E. D. *Syrupus Ipecacuanhæ*, E.

CERA. Wax. (*Concretum ab Ape paratum.*)

Syn. Cire (*F.*), Wachs (*G.*), Washs (*Dutch*), Vox (*Dan.*), Wax (*Swed.*), Wosk (*Pol.*), Cera (*I.*), Cera (*S.*), Ptchela (*Russ.*), Shuma (*Arab.*), Mom (*H. Pers.*), Medhúchhista (*Sans.*), Mellughoo (*Tam.*), Miellie (*Cyng.*).

The Bee (*Apis mellifica*, a hymenopterous insect,) produces, as Bonnet first ascertained, the wax of which the delicate partitions of the cells of its combs are constructed, from honey, sugar, and the sweet secreted juice found in the nectaries of plants; but does not collect it ready formed from the anthers of flowers, as was formerly supposed; a fact which the experiments of Huber and others have verified.[2] The organ by which the wax is secreted

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[1] The following is the continental mode of preparing the syrup:—Take oz. vj. of ipecacuanha in fine powder, and pour over it lbs. vj. of cold water, and after twenty-four hours decant it off; then add lbs. vj. more of water; and again lbs. vj. more, a third time, proceeding always as at first. Mix the decanted liquors, and filter; and then, with a moderate heat, dissolve them in lbs. xij. of refined sugar. One ounce is equivalent to twelve grains of the powder.—*Ann. de Chim.* xlvi. 33.

[2] *Nicholson's Journal*, ii. 182.

has not yet been discovered; but it is deposited in what have been termed wax pockets, situated under the four intermediate ventral segments. These wax pockets are trapeziform, whitish, and of a membranaceous texture; and on them the laminæ of wax are found. Wax is also formed by other insects; and produced as a secretion by many plants, forming the silvery powder or bloom which often covers their leaves and fruit, and is found in great abundance, combined with resin, covering the trunk of the wax-palm, Ceroxylon *Andicola*, of South America [1]; it is also found very pure, encrusting the seeds of the Myrica *cerifera*, or wax-tree of Louisiana and other parts of North America [2]; and the whole of the Benincasa *cerifera*, a species of gourd which grows in China. Wax, in the extended meaning of the term, therefore, may be regarded both as an animal and a vegetable product. But it is the former species only of it, or bees' wax, which is officinal, and demands our present consideration. It is admitted into the list of materia medica under two forms: 1st, As it is procured originally from the combs, combined with colouring matter, or unbleached; and, 2d, Deprived of colour, and purified or bleached.

1. UNBLEACHED WAX.

Officinal. CERA, *Lond.* CERA FLAVA, *Edin. Dub.* Yellow Wax.

Syn. Cire jaune (*F.*), Wachs (*G.*), Gult Wax (*Swed.*), Zotty Wosk (*Pol.*), Cera Gialla (*I.*), Cera qualda (*S.*), Munjie Mellughoo (*Tam.*).

Yellow wax is prepared immediately from the honeycomb.[3] The honey is obtained by dripping and pressing the comb, which is then soaked for some days in clear water to extract all the remaining honey, and afterwards melted in a clean vessel with boiling water, and pressed through cloth bags. It is then remelted and cast into round cakes, in which form it is brought to market.[4]

Qualities.—Good and recent yellow wax has a slight odour of honey, is insipid, and of a bright yellow hue. It is brittle, yet soft, somewhat unctuous to the touch, but without adhering to the fingers, or to the teeth when it is chewed: it acquires tenacity when heated; melts at 142°, and burns entirely away. Its specific gravity varies from 0·9600 to 0·9650. (For the other properties of wax, see *Cera* alba.)

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[1] This palm is found in the Quindin mountains only, rising 180 feet in height, and having leaves 20 feet long. The waxy secretion covers the trunk to the thickness of about 2 inches, and consists of two thirds of resin, one of wax.—*Humboldt, Plantæ Æquinoctiales,* &c. fasc. i.

[2] The *pela*, or natural white wax of the Chinese, is an animal wax produced by a species of coccus,—the Cicada *limbata*, which covers its larva with the white wax in the form of a powder. It is collected and used medicinally by the Chinese. The *white lac* of India appears also to be a variety of wax.

[3] There are bees in India which prepare a black wax.—*Jacquin, Elém. Chim.* p. 34.

[4] Large quantities of wax are imported from the Baltic, the Levant, and the Barbary coast.

Wax in this form is often adulterated with starch, earth, peasemeal, or resin and tallow. *Starch* is readily detected by boiling the suspected wax in water, cooling the fluid, and testing it with tincture of iodine. *Earth, oxides,* and *peasemeal* may be suspected when the cake is very brittle, and the colour inclines more to gray than bright yellow: these impurities may be separated by remelting and straining the wax. The presence of *resin* may be suspected when the fracture appears smooth and shining, instead of being granulated; and it may be detected by putting small pieces of the wax in cold alcohol, which will readily dissolve the resinous part, without acting on the real wax. *Tallow* is discovered by the greater softness and unctuosity of the cake, and its disagreeable suffocating smell when melted.

Medical properties and uses.— Yellow wax is scarcely ever ordered for internal use, although its colouring matter does not affect its medical properties. It is chiefly employed in the composition of external applications.

Officinal preparations.—*Emplastra, Unguenta, et Cerata,* L. E. D.

2. BLEACHED WAX.

Officinal. CERA ALBA, *Lond. Edin. Dub.* White Wax.

Syn. Cire blanche (*F.*), Hwitt Wax (*Swed.*), Biaty Wosk (*Pol.*), Cera biancha (*I.*), Cera bianca (*S.*), Vulay Mellughoe (*Tam.*), Suffiad mooru (*Duk.*), Shuma (*Arab.*), Moam (*Pers.*).

When yellow wax is exposed, with an extended surface, to the action of light and air, and sprinkled with water, the yellow colour and peculiar odour are lost, and it becomes white. This process is thus performed: the yellow wax is melted with a very little water in a copper vessel, and then run off, through a plug-hole in the bottom, into another vessel, which is covered with a cloth to retain the heat until the water and the impurities settle. The clarified melted wax is next suffered to flow into a vessel, called a *cradle,* the bottom of which is full of small holes, through which it runs in small streams upon a cylinder kept constantly revolving over, and partly dipping in cold water, into which the wax falls, drawn out into thin shreds or ribands, and is instantly cooled. These ribands are spread upon cloths stretched on frames exposed to the light and air, and occasionally watered and turned; so that after some weeks the colour nearly disappears. After being thus half-bleached, the wax remains heaped up in a solid mass for a month, when the whole process is again repeated. It is, lastly, generally melted and cast into thin discs about five inches in diameter, in which form it is found in the shops.

White wax is sometimes adulterated with *white oxide* of *lead,* in order to increase its weight; with *white tallow,* and with *potato-starch.* The first is detected by melting the wax in water, when the oxide falls to the bottom of the vessel: tallow is suspected when

the wax is of a dull opaque white, and wants the transparency which distinguishes pure wax; and starch is detected by adding to the suspected wax two per cent. of strong sulphuric acid, and then washing the mixture carefully: the acid carbonizes the starch, without acting on the wax, or it can be detected by iodine.

Qualities.—Pure white wax is perfectly insipid, inodorous, and somewhat translucent. It is harder, less unctuous to the touch, heavier, and less fusible than yellow wax; its specific gravity being from 0·8203 to 0·9662, and its melting point 150°. It is cut easily with a knife, and the surface has a peculiar lustre, which is characteristic, and termed waxy. It melts into a colourless transparent fluid, which concretes again as it cools, resuming its former appearance. Wax is perfectly insoluble in water, and nearly so in cold alcohol, although this fluid takes up about one twentieth of its weight at a boiling temperature; which, however, is again deposited as the fluid cools. Ether acts upon it in the same manner as alcohol. Wax dissolves in the fixed oils, forming the base of cerates and ointments; and unites in some degree, when boiled, with alkalies, forming soaps. The acids at an ordinary temperature scarcely affect it. Dr. John affirms, that 100 parts of wax digested in boiling alcohol are divided into two distinct substances; eighty parts consisting of a body soluble in hot alcohol and oils, and deposited by cooling, and thirteen of a substance nearly insoluble in alcohol; the first of which he has named *cerine*, the second *myricine*.[1]

Cerine is a white crystalline substance, soluble in about 16 parts of boiling spirit, saponifiable by caustic alkalies, and, according to Mr. B. C. Brodie's experiments, seems to consist of two acids, cerotic, and another similar to margaric acid.

Formula $C_{10}\ H_{10}\ O$? (*Van der Vliet*).

Myricine, very much less soluble in alcohol, not readily saponified by alkalies; but when thus decomposed appears to be resolved into an acid and an alcohol (Melissin).

Formula $C_{20}\ H_{20}\ O$? (*Van der Vliet*).

Medical properties and uses.—Wax is regarded as a demulcent, and is sometimes exhibited in obstinate cases of diarrhœa and dysentery, with the view of sheathing the bowels; but its place may be better supplied by simple mucilages and gelatinous solutions. It is generally exhibited diffused in mucilaginous fluids by means of soap, in the proportion of one third part of the wax, with which it is first melted, and then rubbed in a mortar with the fluid, which is gradually added; but Poerner's method, which is first to melt the wax with olive oil, and then to mix the oily compound while hot with the mucilaginous fluid, by triturating with the yolk of an egg, is a preferable one. The dose is a cupful of the emulsion, containing about ℈ j. of wax, given every four or five hours.

[1] *Tableau Chim. du Regne Animal*, p. 209.

Officinal preparations.—*Unguentum simplex*, E. *Unguenta et Cerata varia*, L. E. D.

CERASUS LAURUS-CERASUS. See *Prunus Lauro Cerasus.*

CEREVISIÆ FERMENTUM, *Lond. Dub.* Yeast.

Syn. Levure (*F.*), Güscht (*G.*), Gict (*Dutch*), Fermento di cervegia (*I.*), Espuma de cerbeza, Lavadera (*S.*), Escuma de cerveja (*Port.*).

This substance is the scum or frothy matter which collects on the surface of *wort*, or infusion of malt, while fermenting. It soon undergoes the putrefactive fermentation, but may be preserved by drying it to the consistence of a slightly cohesive paste; in which state it is sold in Paris. It has been microscopically examined by Turpin, and chemically by Westrumb, who obtained from it a variety of ingredients[1], and who gives as its components *oxygen*, *hydrogen*, *carbon*, *nitrogen*, and *sulphur*.[2] But its essential constituent is supposed to be *gluten*, or something very analogous to that vegetable principle. Turpin found it to consist of vesicles containing one or more granules; and he regards these as a species of fungus, which he has named *Torula*. Its medical properties may, perhaps, be attributed to its containing the bitter of the hop, some ready-formed alcohol, and carbonic acid.

Qualities.—Yeast has a vinous, sour odour, a bitter taste; reddens the vegetable blues; and is insoluble in water and alcohol. When it is filtered, a matter remains on the filter which possesses properties similar to those of vegetable gluten; and by this separation the yeast loses the property of exciting fermentation, but recovers it again when the gluten is added. Yeast appears to consist chiefly of an albuminous or proteine compound undergoing the process of oxidation. The addition of yeast to any vegetable substance containing saccharine matter excites fermentation in it, and carbonic acid gas and alcohol are formed.

Medical properties and uses.—Yeast is tonic and antiseptic. Some years ago it was given with seeming advantage in typhoid fevers attended with symptoms of putridity: but the facts brought forward in support of it sefficacy require further confirmation.[3] Dr. Stoker regards it as aperient, and well adapted to improve the alvine discharges and clean the tongue. As an external application to foul and sphacelating ulcers, when united with farinaceous matters in the form of cataplasm or poultice, it is productive of the

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[1] From 15142 parts of yeast, he obtained the following substances: potassa 13, carbonic acid 15, acetic acid 10, malic acid 45, lime 69, alcohol 240, extractive 120, mucilage 240, saccharine matter 315, gluten 480, and water 13595 parts; besides some traces of phosphoric acid and of silica.—*Crell's Annals*, 1796, and *Thomson's Chemistry*, 4th edit. v. 406.

[2] *Mem. de l'Acad. Roy. des Sciences*, xvii. 112.

[3] It was suggested as a remedy in these complaints by the Rev. Mr. Cartwright.

best effects. It corrects the fœtor of the discharge, assists sloughing, and promotes the formation of a benign and healthy pus.

The dose of yeast is a table-spoonful or two (about f ℥ss.), repeated every second or third hour; generally combined with porter, or wine, and sugar. It is also administered in the form of a clyster.

Officinal preparation.—*Cataplasma Fermenti*, L.

CERVUS. *Syst. Nat. Gmelin.* 175.

D. 1. Vertebrata. *Cl.* 1. Mammalia. *Ord.* 7. Ruminantia, *Cuvier.*

G. 29. *Horns* solid; when tender, covered with a velvety coat, and growing at the apex; shed annually; forked. *Fore teeth* eight in the lower jaw. *Tearing-teeth* none (sometimes solitary in the upper jaw).

Species 1. C. *Elaphus.*[1] The Stag, or Hart. *Johnst. Quadr.* 82. *t.* 32. 35.

Officinal. CORNU, *Lond. Edin.* Harts' horns.

Syn. Corne de Cerf (*F.*), Hirschorn (*G.*), Hertshoorn (*Dutch*), Hjorthorn (*Swed.*), Hiortetakke (*Dan.*), Corno di Cervo (*I.*), Cuerno de Ciervo (*S.*), Corne de Veado (*Port.*).

The stag, of which there are three known varieties, is a native of almost every part of Europe, and of the northern parts of America and Asia. In Britain its numbers have been much reduced by the progress of civilisation; but it is still found wild in the highlands of Scotland, the moors bordering on Devonshire and Cornwall, and on the Kerry mountains in Ireland. It is a very beautiful animal, about three feet and a half in height, of a rust-brown colour on the upper part of the body, and whitish below. The horns are annually shed, about the end of February and March; but they are soon reproduced in a soft tender state, full of blood-vessels, and covered with a velvety skin, which is lost as they increase in size; and at length, about the month of July, they become hard, compact, and bony. Stags have no horns till they are above a year old, and these do not branch till the third year; after which the branches increase in number every year, so that the age of the animal may in some degree be determined by the number of the branches.[2]

These horns differ from those of most other animals, and approach near to the nature of bone. It is for the sake of the gelatine that their shavings are medicinally used. These are often adulterated with shavings of mutton bones, which, however, are easily detected by their greater degree of brittleness.

Qualities.—Hartshorn shavings when good are inodorous and insipid, pliant, of an ivory-yellow colour; and contain 27 parts of

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[1] Ελαφος.—*Aristot. Hist. Animal.* ii. c. 7. 18.

[2] The castrated deer is said never to get horns at any period of its life, yet I have the horns of one presented to me by my friend Sir Francis Shuckburgh, Bart., which was reared in his own park; of course he knows its history.

gelatine in 100 parts.[1] Four ounces of the shavings boiled in two pints of water until one pint is dissipated, and the remainder strained, afford, when the decoction cools, a clear, transparent, colourless, insipid, inodorous jelly, which is a compound of gelatine and water.

Medical properties and uses.—The gelatine yielded by stags' horns is considered as a demulcent; but its nutrient properties are more useful than its medicinal virtues. It forms a good article of diet for the sick and convalescent, when it is united with orange juice, sugar, and a little wine; and when mixed with an equal portion of cow's milk, it is very useful in the irritations of infants arising from acidities in the primæ viæ.

CORNU USTUM, *L.*, Burnt hartshorn, consists of phosphate of lime chiefly, with a little carbonate of lime, and phosphate of magnesia; is contained in *Pulvis Antimonii compositus*, Lond.; *Pulvis Antimonialis*, Edin.

CETACEUM. See *Physeter macrocephalus.*

CETRARIA ISLANDICA. See *Lichen.*

CHAMÆMELUM. See *Anthemis.*

CHIMAPHILA. *Spec. Plant. Willd.* iii. 873.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. Ord.* Pyrolaceæ.

G. 873. *Calyx* five-cleft. *Petals* five. *Caps.* five-celled, opening at the angles.

Sp. 4. C. *Umbellata, Nuttall.* C. *Corymbosa, Pursh. Flor. Amer.* 1. *p.* 300. *Barton's Veg. Mat. Med. vol.* i. *pl.* 1. *Woodville's Med. Bot.* 5. *p.* 37. *t.* 10. *Hayne,* xiii. 13.

Officinal. CHIMAPHILA, *Lond. Edin. Dub.* Herb of winter-green.

Syn. Pyrole, Verdure d'hiver (*F.*), Wintergrün (*G.*), Das Wintergrün (*Dutch*), Wintergroen (*Dan.*), Vintergrön (*Swed.*), Pirola (*I.*), Pippissewa, Herbe de paigné (*Amer. Indians*), Rheumatism Weed, l'herbe à pisser (*Can.*).

This species of Chimaphila is found in several parts of Europe, Asia, and particularly America. It seldom exceeds eight inches in height; is found chiefly in moist, shady places, and in a loose, sandy soil. It flowers in June.

The rhizome is long and creeping: the stems, which rise together from the rhizome, are erect, angular; red at the lower part, yellowish above: the leaves, which are alternate and in irregular whorls, are sub-sessile, lanceolate, and somewhat wedge-shaped, sharply serrated, of a coriaceous texture; bright deep-green on the upper and pale on the under disk. The flowers are generally from three to five in number. The calyx is persistent and five-parted: the corolla consists of five roundish, concave, spreading petals, white tipped with rose, and exhaling an agreeably spicy

[1] *Ann. de Chim.* xxxiv. 71.

odour: the anthers are purple, bifurcated, and supported on awl-shaped filaments: the germen is green, globular, angular, covered with a viscid secretion, and supporting a sessile, thick, persistent stigma. The seed-vessel, which is persistent through the winter, is a five-angled, roundish capsule, inclosing many chaffy seeds, which are discharged by the angles opening.

Qualities.—This plant is astringent, and affords an infusion with water, which strikes a black colour with sulphate of iron. Al ohol also extracts the medicinal properties of pyrola, which seem to reside in a gum-resin. Dr. Wolff obtained, from 100 parts, 18·0 of *bitter extractive,* 2·04 of *resin,* 1·38 of *tannic acid,* and the remainder *woody fibre,* combined with a small portion of *gum,* and some *calcareous salts.* I have found in it a larger proportion of *tannic acid.*

Medical properties and uses.—Chimaphila is diuretic and tonic. It has been given successfully in ascites[1], after digitalis and other diuretics had failed; and has also proved serviceable in acute rheumatism, intermittents, and other diseases assuming an intermittent type. It produces an agreeable sensation in the stomach soon after it is swallowed, increases the appetite, and acts powerfully on the kidneys. The urine seems to imbibe the colour of the infusion of the herb, which is that of an infusion of common green tea. The dried herb is best administered in the form of decoction, made with ℥j. of the plant, including rhizome, stalks, and leaves, cut small and macerated in two pints of water, and then boiled down to one pint, which is to be taken in divided doses within twenty-four hours.

Officinal preparation.—*Decoctum Chimaphilæ,* L. *Decoctum Pyrolæ,* Dub.

CHIRAYTA, CHIRETTA, *Edin. Dub.* Chiretta.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Gentianaceæ.

Syn. Chiraceta (*Hind.*), Shayraet coochie (*Tam.*).

This plant is a native of Nepal and the north of India. It was supposed by Fleming[2] to be a Gentian, and was described by him under the name Gentiana *Chirayta;* but the late Professor Don[3] ascertained that it was not a Gentian, and formed a new genus of it under the name Agathotes *Chirayta;* an opinion adopted by the Edinburgh College, which has placed it in the list of materia medica. It is arranged in the order Gentianaceæ. It is an annual, rising from two to three feet high, with a straight, round, smooth stem; slightly branched. The leaves are opposite, lanceolate, acute, entire, amplexicaul; the flowers numerous, stalked; the whole upper half of the plant forming an elegant, oblong, leafy

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[1] *Medico-Chirurg. Trans.* vol. v. p. 340. [2] *Asiatic Researches,* xi. 167.
[3] *Lond. Phil. Mag.* 1836, p. 76.

panicle; *calyx* four-cleft, divisions linear, acute, permanent; *corolla* yellow; limbs four-parted, spreading, permanent; *stamens* four, anthers cloven at the base; *style* single, with a large, two-lobed stigma; *capsule* one-celled, two-valved, opening at the apex, containing many seeds adherent to the sides of the valves. The whole plant is medicinally used: it is pulled up when the flowers begin to wither, and is dried in the air. The root is more bitter than the plant.

Qualities.—The dried plant is inodorous, its taste intensely but not disagreeably bitter. Both water and spirit take up its active principle, which seems to be *bitter extractive.* According to Lassaigne and Boissel[1] it contains *resin,* a *yellow bitter matter, brown colouring matter, gum, malic acid, malate and sulphate of potassa, chloride of potassium, phosphate of lime, silica,* and *traces of oxide of iron.* The infusion evoporated yields an extract closely resembling extract of gentian.

Medical properties and uses.—Chirayta is a simple tonic. It was long employed as such by the natives of India. It was introduced into this country as a substitute for gentian, under the idea that it exerts some specific influence on the secreting powers of the liver. It is a bitter admirably adapted as a vehicle for the alkalies, and the tincture of the sesquichloride of iron. It may be administered in the form of powder in dose of ℈j., or in that of infusion.

Officinal preparation.—*Infusum Chirettæ,* E. D. *Tinctura Chirettæ,* D.

CHLORINIUM. *Chlorine.* See Part III., *Chlorinii Aqua, Preparations of Chlorine;* and Pharmacopœia, APPENDIX.

CHLOROFORMYL. *Chloroform.* See *Preparations of Æther,* Part III.

CINCHONA.[1] *Spec. Plant. Willd.* i. 957.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Cinchonaceæ.

G. 346. *Corolla* funnel-shaped. *Capsule* inferior, two-celled, bipartite, with a parallel partition. *Seed* winged.

* *Corollas downy, with the stamens included.*

This important genus, of which a great number of species have been described, is not yet altogether freed from the ambiguity which has so long involved it. Much has been effected by the industry of the Spanish botanists, whom their government sent out to make inquiries concerning it, and still more by the recent researches of M. Weddell, who was deputed by the French govern-

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[1] *Journ. de Pharm.* vii. 283.

[2] Supposed to be named after the Countess del Chinchon, wife of a viceroy of Peru, who introduced it into Europe, on her return to Spain in 1640. The Peruvian name is *Gannanaperide.*

ment to investigate the subject, and on his return in 1849 published a splendid work, entitled *Histoire Naturelle des Quinquinas*, to which we refer such of our readers as are desirous of more fully studying this subject; yet many species remain undescribed.[1] Much has been written on the subject by Mutis, a celebrated botanist, who resided in the neighbourhood of Santa Fé de Bogota, as director of the exportation of bark[2], and his pupil Zea, and also by Ruiz and Pavon; and valuable matter also has been given by Humboldt and Bonpland respecting certain species; but with regard to others, their authority is of little value. The species first delineated by Condamine in 1738, in the *Mém. de l'Academie*[3], was named by Linnæus *officinalis;* under which term, however, two very distinct species were confounded by that distinguished naturalist. The last edition of the London Pharmacopœia stated that the three kinds of barks known in the shops were furnished by three distinct species, namely, C. *lancifolia*, C. *cordifolia*, and C. *oblongifolia;* thus adopting the arrangement and names of Mutis; but in the present edition they have altered the references as will be found below.

Prior to the year 1772, all the Cinchona bark brought to Europe was shipped at the ports of the Pacific; but since Don Jose Celestina Mutis discovered the Cinchonas about Santa Fé de Bogota, some inferior bark has come by the way of Carthagena de Indias to Cadiz. Before describing the officinal species, it is proper to give some account of the geographical distribution of the genuine Cinchonas. No authority on this part of our subject is equal to that of Mr. Poppig, from the translation of whose account, in the *Companion to the Botanical Magazine*, I have extracted the following details:—The mountains of Huanuco, comprehending the woods commencing near Ceja in Huamalies, and stretching eastward through the northern part of Huanuco, are the chief districts of the bark collectors. The Cascarilleros of Huanuco

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[1] In a large collection of dried specimens of the genus Cinchona in my possession, which were collected in 1805, both near Loxa and at Santa Fé, I find many species which are not mentioned in the works of any of the Spanish botanists; nor by Mr. Lambert, to whom I gave specimens of many of the species. Many of them are described by my friend and colleague, Dr. Lindley, in his *Flora Medica*.

[2] Mutis was a native of Cadiz, and went to Santa Fé in 1760, as physician to the viceroy, Don Pedro Misia de la Cerda. He discovered Cinchonas in the forests between Guaduas and Santa Fé, in 1772; although the credit of this discovery was attempted to be wrested from him by Don Sebastian Jose Lopez Ruiz; who, however, from his own documents, transmitted by his brother to Baron Humboldt, to prove the priority of his discovery, appears to have known the Cinchonas about Honda only since 1774. Mutis is, however, said by Dr. Lindley to have introduced more false ideas respecting the origin of the Cinchona barks than any other writer on the subject.

[3] Condamine made the first and the only attempt that has been made to bring young cinchona trees alive to Europe. He nursed them for eight months during a passage of 1200 leagues; but they were washed out of the boat into the sea, and lost near Cape Orange, north of Para.—*Lambert's Illust. of the Genus Cinchona*, 4to. 1821, p. 24.

(as those collectors are called) range through the eastern side of the Andes in that province, skirting the Rio Monzon, and reap a rich harvest in the valley of Huallaga and the other deep valleys and defiles which intersect the country in this direction. In the warm subalpine valleys the Cinchonas are deteriorated, and the habit of the trees materially changed. In the Cinchona forests of Huanuco the collectors are attentive to variations arising from locality. They bark only trees growing on steep declivities or the mountain tops, and reject those that stand in groups where the soil is moist, the air warm, and the ventilation defective. The most costly bark is that obtained from the highest and coldest spots. On the mountains of Panataguas and Pampayaco the best kinds are procured; but the bark of the Cascarilla hoya de Oliva, which grows in small quantities near San Rafael, is considered the finest of all.

The trees are peeled from May until November: they are sometimes cut down[1], and allowed to remain on the ground three or four days before they are barked; occasionally that process is performed as they stand.[2] The mode of barking is simple: the cascarilleros first decide on the maturity of the branches to be barked by stripping off a small piece of bark from the branch, and observing whether it immediately reddens on the inner side: if it does, they consider it sufficiently mature; but should the colour not appear in three or four minutes, it is rejected as immature.[3] When the branches are of a small size, the bark is quilled; when they are large and the bark thick, it does not assume this form. Quilling, however, depends a good deal on the manner in which the bark is separated from the branch. This is effected by making a longitudinal incision through the bark, and then passing under it a thin knife, so as to separate quickly the whole slip. As it dries, the internal surface shrinking more than the external, it rolls up and forms the quill. A feeble quilling denotes that the bark is either too old, or has been too slowly dried; too much quilling, that it is too young or has been too quickly dried; a moderate quilling, that the bark has been of a proper age and well dried. The bark collectors often employ heat when there is a want of sun; but when this has been done, the inside of the bark displays stripes of a whitish sickly hue. The Cinchona barks, known in this country, may be classed, according to the long known arrangement, into *pale*, *yellow* and *red* bark.[4]

The genus Cinchona belongs to the first tribe of the natural order Cinchonaceæ. It has been separated by De Candolle from

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[1] *Poppig.* [2] *Phil. Trans.* vol. xi. p. 81—86. 1737.
[3] Memoir on Quinquina, in *Lambert's Illustrations of the Genus Cinchona*, 4to. p. 64.
[4] For an account of bark peeling, &c., see *Pharmaceutical Journal*, vol. ix. 1849–50, which contains an abstract from Weddell's work.

the following genera, which were formerly confounded with it, namely, *Bucna*, *Remijia*, *Exostemma*, *Pinckneya*, *Hymenodyction*, *Luculia*, *Danais*. The diagnostic characters of the tribe *Cinchoneæ*, in which the genus Cinchona is arranged, are the following, according to De Candolle: "Fruit capsular, two-celled; cells many-seeded; seeds winged; albumen fleshy; trees or shrubs; leaves opposite; stipules interpetiolar." Those of the genus are: "*Calyx* five-toothed. *Corolla* hypocrateriform, with a five-parted limb, valvate in æstivation. *Anthers* linear, inserted with the tube, and not projecting, unless in a very slight degree. *Capsule* splitting through the dissepiment into two cocci open at the commissure, and crowned by the calyx. *Seeds* girted by a membranous lacerated wing." The *leaves* are upon short petioles, with flat margins, and ovate or oblong, foliaceous, free, deciduous stipules; the *flowers* are terminal, in corymbose panicles, of a white or a purplish rose colour.

PALE BARKS.

There are two varieties of pale bark known in English commerce, namely *crown* and *gray bark*.

Var. a. *Officinal.* CINCHONA PALLIDA (de Loxa), *L.* CINCHONA CORONA, *Edin. Dub.* Crown bark.[1] Loxa bark. Referred to Cinchona Condaminea (Weddell) by the London College; to Cinchona Condaminea (Humboldt and Bonpland) by the Edinburgh and Dublin Colleges.[2]

Syn. Quinquina de Loxa, Quinquina couronne (*F.*), Kron-China, Loxa China (*G.*), Quina de Loxa, Quina de Loxa corona, Cascarilla fina de Uritusinga (*S.*).

The tree which yields this bark, Cinchona *Condaminea*, is found chiefly in the neighbourhood of the village Ayavaca, and Guancabamba, in the mountains of Cajanuma-Uritusinga, near Loxa; and in those of Boqueran, Villonaco, and Monje. It grows at elevations between 6250 and 8300 feet, where the mean temperature varies between 59° and 62° of Fahr., on a bottom of micaceous schist; and occupies a zone of 1800 feet. It is a lofty, handsome tree, always in leaf; from thirty to forty-five feet in height, and from one to four feet in diameter. The trunk is erect; the branches are in opposite pairs, erect, brachiated; with the younger ones obscurely quadrangular at the nodes, and smooth as high as the inflorescence. The leaves are of a lively green, shining, ovato-lanceolate, occasionally only lanceolate, about four inches long, with a little pit in the axillas of the veins on the under surface,

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[1] The name *Crown Bark* is derived from its being that used by the royal family of Spain. In a Spanish galley, captured by the English near Cadiz in 1804, were several chests of this bark, lined with sheet iron, and marked "Para la real familia."

[2] The London and Dublin Colleges formerly referred the pale bark of the shops, comprehending both this variety and the grey bark, to the Cinchona *lancifolia* of Mutis, which, however, yields the orange bark, Quina *naranjada*, of Bogota, not known in English commerce. They now refer it to C. *Condaminea*.

having the orifice shut with hairs: they stand on purplish foot-stalks one fourth of their length. The form of the leaf varies according to the altitude at which the tree grows, particularly before it comes into flower. The stipules are two, oblong, obtuse, membranous, and smooth. The flowers, which appear in May, June, and July, are in large corymbose panicles, odorous, of a pale rose colour, and furnished with small bracts. The calyx is bell-shaped, five-toothed, pubescent like the pedicels, with fine teeth, ovate, acute, very short, contiguous, and violaceous. The corolla is somewhat salver-shaped, longer than the calyx, with the tube obscurely pentagonous, pubescent, more frequently of a rose colour; the *limb* is rotate, with linear lanceolate segments, much shorter than the *tube*, woolly or shaggy on the inside. The anthers are linear, twice the length of the free portion of the filaments, and the free parts of these are two thirds shorter than the adherent.[1] The ovary is nearly globular, supporting a filiform style with a bifid stigma. The capsule is crowned with the calycinal teeth, is two-celled, many-seeded, oppositely twice-furrowed, and opening from the base to the apex with two valves. The seeds are lenticular and winged, or bordered with a ragged membrane. This description is correctly applicable to those specimens of C. *Condaminea* in my possession, even to the fact of the variety in the foliage, which is very striking in several of my specimens.[2]

This tree affords the original Cinchona bark of Peru, which is now very rare, 110 quintals only being cut, instead of 4000, which was the quantity cut in 1779.[3] The branches are decorticated in the dry season, from September to November, which is the period when all the kinds are barked, and the bark is carefully dried in the sun. The trees frequently die after the operation. This bark is the *Cascarilla fina de Uritusinga*, *Quina fina*, *Quina de Loxa*, and *Q. de Loxa corona* of the Spaniards, the *Cascara de Loxa* of Condamine. It is preferred in South America to all the other Cinchonas, and is known to the English by the name of *Loxa* and *Crown bark*. Two other varieties of it are also known in Spanish commerce by the names of *Lagartijada* (lizard-like), and *Negrilla* (blackish), from the colour of their epidermis.

This bark arrives in Europe packed in chests made of slips of wood roughly fastened together, and covered with skins: each chest contains about 100 lbs. weight, well packed, but generally mixed with a quantity of dust and other heterogeneous matter. It is also imported in serons, holding from 60 to 90 lbs. each. The pieces vary from eight to fifteen inches in length; the bark,

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[1] *Humboldt.*

[2] The bark afforded by C. *Condaminea* was known so early as 1694; and the plant was described by Condamine in 1738.

[3] Estan raro, que apenas corresponde á uno par mil de las ostras especies juntas.— *Ann. de Hist. Nat.* tom. ii. p. 210.

in some of them, is scarcely one tenth of an inch, in others it is one eighth, in thickness: it is singly and doubly quilled, or rolled inward, the quills generally being in size from a swan's quill to an inch in diameter.[1]

It has a grayish, or dull brown or black, or cineritious epidermis, often much covered with hairy[2] and other lichens, chiefly species of Opegraphæ, Arthoniæ, Graphis *fulgurata*, Chiodecton *effusum*, Pyrenula *verrucarioides*, Ascidium *Cinchonarum*, Lecanoræ, Parmeliæ, Sticta *aurata*, and Collemata; the latter indicates that the bark is bad.[3] The epidermis is often transversely cracked, more or less obvious; sometimes it is rough and warty; and occasionally it is longitudinally furrowed. This bark is internally of a pallid fawn or cinnamon brown hue, sometimes of a dull tint. This colour is brightened when the bark is moistened, approximating to pale orange. The fracture of the pieces is usually clear, and slightly fibrous within, but in the larger quills it is fibrous. If it separates into fibres when chewed, it is of an inferior quality. The colour of the powder is a fawn, or cinnamon brown. Both the fine and coarse-quilled varieties are evidently the bark of the same tree; the fine-quilled sort being that of the smaller, and the larger that of the thicker branches. But the chests probably contain barks obtained from different species of Cinchona; namely, the *White Loxa*, the *Leopard Crown*, *Pardo-obscura*, the *Ash-bark*, Cascarilla *pallida* of Ruiz, and that known in commerce under the name *Huamilies bark*[4], or *Rusty bark*.

Qualities. — Good bark of this description has little odour when in substance, but during decoction the odour is sensible, and agreeably aromatic. The taste is bitter, but not unpleasant, slightly acidulous and austere, moderately astringent, resembling in some degree that of a dried rose. The best specimen of this bark which could be procured by me, and subjected to experiment, gave the following results:—water at 212° extracted all its active principles: affording an infusion, which, when filtered, was of a pale reddish-yellow colour, and had the odour and taste of the bark.

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[1] The great desire of our bark merchants to procure quilled bark has induced the bark gatherers often to produce this effect by heat, which always diminishes the virtue of the bark. — *MSS. of Don Felix Devoti of Lima*, in my possession.

[2] On this account the inhabitants of Peru name it *Quinacana*, hairy Quina.

[3] The test of the goodness of the barks by the kinds of lichens found on them, proposed by M. Fee, is too difficult for practical purposes, and by no means to be depended on.

[4] Von Bergen, *Versuch einer Monographie der China*, Hamburgh, 1826. The Huamilies or rusty bark is supposed to be the bark of Cinchona *purpurea*. It is sometimes found mixed with Loxa bark, but rarely as a distinct kind in this country. One variety of it, in middling fine quills, is found not uncommonly among the Loxa bark. It displays a greyish corky epidermis, easily removed, and transversely cracked; and frequently covered with rusty coloured warts. It contains more Cinchona than Quina, in variable proportion, and a considerable quantity of *Kinova bitter*; a principle discovered by Winckler, which Buchner, jun., has stated to be identical with Smilacine.

The infusion reddened litmus paper; was instantly and copiously precipitated by infusion of galls; and, in a smaller degree, and more slowly, in yellowish flocculent flakes, by solution of isinglass, *gelatin*. A solution of tartar emetic was rendered turbid, and slowly precipitated by it; this effect was quickly and copiously produced by solutions of diacetate and acetate of lead. Proto-sulphate of iron changed its colour to bright olive-green, but was scarcely precipitated. Decoction afforded a more saturated solution, with a reddish, golden-yellow colour, from which a yellowish precipitate was deposited. The powder macerated in sulphuric ether afforded a golden-yellow tincture, which reddened litmus paper, and left a pellicle of bitter resin, when it was evaporated, on the surface of water, to which it gave the colour of the tincture. This coloured water had the flavour of the watery infusion; but differed from it in not precipitating the infusion of galls nor that of tartar emetic, and in throwing down a copious precipitate from the solution of proto-sulphate of iron. With alcohol the powder afforded a tincture of a deep orange hue, which precipitated sulphate of iron, potassio-tartrate of antimony, and infusion of galls; became turbid when added to water, and let fall a light reddish precipitate. But these experiments threw no light on the nature of the active principle of this species of Cinchona; and it was not until the subject was investigated by MM. Pelletier and Caventou, in 1818[1], that that principle was ascertained to be an alkaline substance, which has been named *Cinchonia*, combined with a peculiar acid, the kinic, forming a kinate of the alkaloid: and subsequent analyses discovered also in it a small quantity of another alkaloid, *Quina*, as a kinate of *Quina*.[2] This bark has since been analysed by Bucholz, who obtained 0·36 of *cinchonia*, 1·17 *kinic acid*, 1·30 *kinate of lime*, 9·97 *hard resin* or *red cinchonia*, 1·56 *soft resin*, 0·78 *fatty matter*, 5·80 *tannic acid* with *chloride of calcium*, 4·43 *gum*, a trace of *fecula*, and 74·68 *lignin and loss* = 100·00.[3] According to Veriton, 1·4 per cent. of cinchonia is obtained; or 80 grains from lb. j. of bark.

The characters of this bark, according to the London College, are as follows:—" Thin, quilled; the outer surface brown, often covered with lichens, and split with many transverse cracks, occa-

[1] *Journ. de Pharm.* vii. 70.

[2] None of the kinates can be procured directly from the bark in a crystalline form, but they may be formed by the direct combination of kinic acid with the cinchonia or quina; or by the decomposition of the sulphates of these alkaloids by means of the kinate of lime, which may be procured by evaporating an infusion of bark to an extract, then treating this with alcohol until a viscid residue is left, which consists of mucilage and kinate of lime. If an aqueous solution of the viscid residue be made, and evaporated at a gentle heat, crystals of kinate of lime are deposited, and may be purified by a second crystallization. To obtain kinic acid, a solution of the kinate may be decomposed by oxalic acid; the acid remains in solution, and is readily obtained by crystallization, transparent and colourless.

[3] *Gmelin, Handb. d. Chim.* ii. 1283.

sionally encompassed with them; the inner surface of a cinnamon brown; taste bitter and astringent."

Var. b. Officinal. CINCHONA CINEREA, *Edin. Dub.* Gray, Silver, or Huanuco bark. Bark of Cinchona micrantha. (Ruiz and Pavon.)

This second variety of the pale bark of English commerce is noticed only by the Edinburgh and Dublin Colleges.

There is every reason for believing that the tree which yields this bark is the C. *Micrantha*[1], found in the high, cool, and wooded mountains of Peru near Chicoplaya, Monson, the Pueblo de San Antonio de Playa Grande; and also, according to Humboldt and Bonpland, in the province of St. Jaen de Bracamorris. The tree is lofty and of considerable circumference. The branches are quadrangular, quite smooth, except among the inflorescence. The leaves are oblong, only moderately acute, about nine inches long without the footstalk, smooth on both sides, distinctly pitted at the axilla of the veins, and generally hairy there: those leaves near the inflorescence are shorter and more obtuse. The flowers are small, in a loose terminal pannicle, naked but downy on the upper divisions. The *calyx* is tomentose, with a five-toothed, short limb, remaining nearly unaltered in the fruit. The *corolla* is tomentose, woolly, within the limb.

This bark is the *Quinquina de Lima* of Guibourt; *China Huanuco, Graus China* of Bergen; *China Huanuco, Yuanuco Havane* of Goebel; and *Cascarilla Provinciana* of Poppig.[2] It is also known in Peru under the names *Cascarilla fina de Chicoplaya,* and *Pata de Galinazo.* It is of more recent introduction than crown bark[3], and not very common in the English market: but when imported, it is in chests and serons. The quills are larger and coarser than those of the *Crown bark;* being usually from a quarter of an inch to an inch, sometimes two inches, in diameter; the edges of the quills are feathered, and they are rolled in somewhat of a spiral form: the bark itself is between one-twelfth and one-twentieth of an inch in thickness. The epidermis, which is of a gray or ash colour, is transversely cracked; but the cracks are partial, not surrounding the quills; their edges are flat; and they are often altogether absent. The lichens found on it are different species of *Opegraphæ; Graphides; Arthoniæ; Pyrenulæ; Verrucariæ;* Trypethelium *variolosum;* Ascidium *Cinchonarum,* and Lecidea *tuberculosa.* The inner surface of the small quills is smooth, of the large fibrous, and the colour in both is a rust-brown, and the fracture resinous.

Qualities.—Good bark of this description has a peculiar earthy odour, and an astringent, aromatic, bitter taste. It is more bitter

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[1] *Flora Peruv.* ii. 52. t. 194. *Lindley, Flora Med.* p. 412. I have two specimens of the plant in my collection. It is certainly identical, as Dr. Lindley says, with C. *scrobiculata.*

[2] *Pereira.*

[3] It has been known only since 1785.

than crown bark; but it displays the same properties when treated with water, alcohol, and ether. Van Santen procured from one pound of this bark from 74 to 210 grains of *cinchonia*, but no *quina*: Goebel and Kirst also found no *quina*, but 165 grains of *cinchonia*; but Michaelis procured from one sample 50 grains of *cinchonia* and 32 of *quina*, and from another 74 grains of *cinchonia* and 28 of *quina*.

There are other pale barks; but they are little known in English commerce, and are not officinal.

YELLOW BARK.

Officinal. CINCHONA FLAVA, *Lond. Edin. Dub.* Bark of Cinchona Calisaya, *Lond.* Bark of an unascertained species of Cinchona. *Edin. Dub.*

Syn. Quinquina jaune, Quinquina Calisaya (*F.*), Gelbe Chinarinde, Rieberrinde, Königs-China (*G.*), Gul Kinabark (*Swed.*), China (*I.*), Colli-sallo (*S.*).

The source of yellow bark is now determined; it had been long ascertained that the C. *cordifolia*, to which it was referred by the London and Dublin Colleges, did not yield the yellow bark of English commerce. The Dublin College, 1850, appears to have been unacquainted with M. Weddell's work.

The tree, which was formerly stated to afford this bark in the London and Dublin Pharmacopœias, is found on the mountains of Santa Fé de Bogota, growing along their skirts, and on the plains, under the 4th degree of north latitude, on heights betwixt 900 and 1440 toises; flowering from May to September. The true yellow bark is exported from Arica, a port of Bolivia, in the province of La Paz[1], in Upper Peru, whence it is carried to Lima. Dr. Lindley[2] assumed with Ruiz, that it is the production of Cinchona *lanceolata*, a tree which grows on the cold, elevated mountainous groves on the Andes, in the districts of Muna, Panas Pillao, and Cuchero. He thought it also probable that a portion of our yellow bark was furnished by the C. *hirsuta* and C. *nitida*[3]; but there were no accurate data on which to base this opinion.

The genuine quilled yellow bark is the *Calisaya arrollada* of the Spaniards; the flat the *Calisaya de plancha*, *de Quito*, *de Lima*.[4] It is the *Quina regia* or *King's China* of Von Bergen. The trees yielding it are barked at every season, except the rainy, which extends from November to March. The tree is often cut down to four feet from the ground; but the branches only are

[1] The town of La Paz is 15,360 Spanish feet above the level of the sea; the climate is moist and rainy, the soil rich, and the medium temperature 41°.

[2] *Flora Medica*, p. 416. Before the researches of M. Weddell.

[3] I possess two specimens of C. *hirsuta*, and one of C. *nitida*.

[4] The name *Calisaya* is that of a province producing this bark, in the most southern part of Peru, in the Intendencia de la Paz. There are three varieties of Calisaya known in South American commerce: 1. *Calisaya arrollada*, rolled Calisaya; 2. *Calisaya de plancha*, flat Calisaya; 3. *Calisaya de Santa Fé*, which is also a thick, hard, flat bark.—*MSS. of Dr. Devoti.*

barked. But barks of different species are mixed together, and sold under the general name of Calisaya.[1] Yellow bark is brought to this country in chests and serons, containing about 90 lbs. to 150 lbs. each; and consists of pieces about eight or ten inches or more in length, some quilled, but the greater part flat.[2] The quilled pieces are less rolled and much thicker than the quilled pale bark; the quills varying from the third of an inch to two inches in diameter. They are generally coated. The epidermis, which is of a tawny, greyish-brown colour, and covered with flat and stringy lichens, is more rough and chopped, with transverse cracks going completely round the quill: the cuticle is easily removed, and is often as thick as the bark itself, which is about one eighth of an inch: the interior is of a yellow colour, passing to orange, from eight to eighteen inches in length, from two to three inches in breadth, and from a quarter to half an inch thick. The lichens on the epidermis of the quilled pieces are nearly the same as those found on the pale bark; but, besides these, some fungi, — namely, Hypochnus *rubro-cinctus* and Triclinum *Cinchonarum;* one of the Hepaticæ, Jungermania *atrata;* and Hypnum *Langsdorfii,* a moss, — are found on the inferior specimens. The flat pieces are generally without any epidermis, and of the same yellow hue without and within as the quilled. Both are mixed in the same chest. The epidermis yields a dark-red powder, which is tasteless and inert.

M. Weddell has now satisfactorily determined the source of the yellow bark of commerce, having been an eye-witness of the felling and peeling of the trees, during his residence in Bolivia and Peru. He names the tree *Cinchona Calisaya,* of which the following are the botanical characters.[3]

"*Specific characters.* — Leaves oblong or lanceolate; obovate, obtuse, attenuated at the base, rarely acute on both sides, smooth, polished or pubescent beneath, scrobiculate in the axils of the veins; filaments usually shorter than one half the length of the anthers; capsule ovate, scarcely equal in length to the flowers; seeds frequently fimbriate-denticulate at the margin.

α Calisaya vera. — A tree with obtuse, oblong-ovate, or oblong-lanceolate leaves.

β Josephiana. — A shrub with somewhat acute, oblong-lanceolate or ovate-lanceolate leaves.

Habitat. — Bolivia and southern Peru.

α Calisaya vera. — A tall tree, trunk straight or bent, naked, not unfrequently twice the thickness of a man's body. The leafy head (*coma*) for the most part elevated above all the other forest trees.

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[1] MS. of Don Jose Granado, a physician who lived many years in La Paz.

[2] These are distinguished in commerce by the terms *with coat* and *without coat.*

[3] *Pharmaceutical Journal,* vol. ix. Extract from *Weddell's Histoire Naturelle des Quinquinas.*

Bark of the trunk thick; the periderm mostly thicker than in other species of the genus, easily separable from the liber, and, when separated, exposing on the surface of the latter furrows or impressions resembling carvings; furnished with vertical parallel fissures, and transverse more or less annular scissures; whitish and also blackish; periderm of the branches whitened or variously marked by the thalli of lichens, and marked by rather sinuated fissures and narrower scissures; bark of the branchlets thin, smooth, and brownish, olive-coloured, or blackish. It grows in declivities and steep and rugged places of the mountains, at an altitude of from 1500 to 1800 metres, in the hottest forests of the valleys of Bolivia and southern Peru; between 13° and 16° 30′ south latitude, and from 68° to 72° west longitude; in the Bolivian provinces of Enquisivi, Yungas, Larecaja, and Caupolican, and in the Peruvian province of Carabaya. It flowers in April and May.

The bark is commonly called indiscriminately by the Spaniards and Indians *Cascarilla Colisaya, Calisaya,* or *Culisaya.*

β Josephiana.—A shrub from two to three metres high, with a slender branched trunk, of from three to five centimetres thick; branches erect; bark adhering firmly to the wood; that of the trunk and branches schistaceo-blackish, smoothish, or furnished with different lichens, and marked in an annular manner by some narrow, distant scissures; that of the branchlets reddish-brown.

When the peridermis of these Cinchonas falls, the two faces of the dermis are of a yellowish colour, which soon turns to brown. The odour is then that of the bark of elder, but not quite so powerful. The taste is very bitter, with scarcely any astringency, but having some degree of sharpness. The bitterness is felt on touching it with the point of the tongue.

From the external surface, especially when this has been bruised, there exudes a yellowish, gummy, resinous matter, sometimes rather milky, bitter, and astringent, to which the cutters ascribe the virtues of the cinchona. This matter is that which fills up all the cells of the dermis, and which escapes from fissures in the young bark. It stains the clothing of a dull red, and its presence influences the colour of the bark when dried. The Cascarilleros pretend that the abundance of milk, as it is called, which is greater in the bark of *Cinchona Calisaya* than in that of other species, retards its desiccation. It is especially from the effect of pressure that this juice becomes abundantly diffused over the surface of the denuded bark; the bruised points may then be observed to assume a reddish colour, which is more intense as it has been immediately and more directly exposed to the solar rays. I have even seen some Cascarilleros irritate the whole surface of the denuded bark with a hard brush, in order that the colour might be uniform.

The consistence of the bark when it is first taken from the tree

may be compared to the flesh of a mushroom, and it may be broken in any direction with the greatest facility. The Cascarilleros attach much importance to this character, which is the more marked, as the quality is better. In the inferior barks, and especially in the false cinchonas, when the attachment of the cortical fibres exist to a greater extent, the transverse fracture of the dermis is effected with more difficulty.

The superiority of Calisaya bark over all the other Cinchona barks dates especially from the important investigations of Pelletier and Caventou; this superiority having been previously shared by the Loxa bark, which at the present time may be said to be almost valueless. Indeed, this latter scarcely contains any thing but cinchonine; whilst the Calisaya bark contains but a small proportion of this base, yielding as much as from 30 to 35 parts in 1000, that is to say, from 3 to 3½ per cent. of sulphate of quinine. As is the case with most of the Cinchona barks, this species is met with in commerce in two forms, which it is necessary to distinguish. These are the *rolled Calisaya* and the *flat Calisaya.* The first is almost always covered with its peridermis, the second is generally deprived of it.

Rolled Calisaya Bark.—Peridermis rather thick, rough, unequal, marked from place to place with annular cracks, and in the intermediate spaces with transverse and longitudinal crevices, which are more or less near to each other, sometimes uniting, and the edges thick and raised, of a dull silver-white or grey colour, or beneath of a blackish-brown, tending to a slate colour, with white marbling caused by the cryptograms which cover it.

Dermis externally smooth, or more frequently marked with little linear or punctiform impressions, corresponding with the fissures or cracks in the peridermis; of a rufus colour more or less bright; the internal surface finely fibrous, of a yellowish rufus colour; breaking sharply in a transverse direction, with a resinous appearance externally, and slight projection of the fibres beneath.

Flat Calisaya Bark. — Generally consisting merely of the liber, sometimes ten or fifteen millimetres (·39 to ·5 of an inch) in thickness, of considerable density, and generally of a perfectly uniform texture. *Exterior surface* irregular, marked with confluent longitudinal furrows, fibrous at the bottom, and uniting ridges of a brownish or yellowish rufus colour, frequently marked with patches of a blackish-red.

Internal surface very closely fibrous, the grain frequently undulated, of a yellowish rufous colour, sometimes with an orange tint, especially if the bark be fresh. *Transverse fracture* purely fibrous, the fibres very short, becoming very easily detached, and penetrating the skin with great facility, causing an irritation which has been compared to that of *Dolichos pruriens. Longitudinal fracture* without splinters, the surface covered with brilliant points, owing to the reflection of the light from the denuded

fibres; the colour uniform throughout the bark. *Flavour* freely bitter, which is gradually developed on mastication, and scarcely astringent.

The variety just described is the most common; it is known in Bolivia under the following names: *Calisaya amarilla, C. dorada,* or *C. anaranjada.* Another variety, remarkable for the dark colour of its surface, which is sometimes of a vinous black, bears the names of *Colisaya Zamba, C. nigra,* or *C. macha.* I have observed it especially at Apolobamba, in Bolivia, and in the province of Carabaya, in Peru.

Lastly, a third variety, the surface of which is more smooth, sometimes half cellulous, and of a paler colour, has merited the designation *Calisaya blanca.*

The peridermis acquires, as I have already said, a greater development in this species than in any other. It is not uncommon to find fragments left adhering to the dermis to at least a centimetre in thickness. It will be found that this is formed of several distinct strata, resulting from layers which have successively contributed to its formation. Its colour is generally more or less grey on the exterior, and brown within; and it is constantly marked with deep, longitudinal, and transverse fissures, generally limiting quadrilateral surfaces.

The bark of Cinchona *Josephiana,* or *Ichu cascarilla,* of the Peruvians, has hitherto but rarely been met with in commerce, although it is used, perhaps, as often as any other among the natives, in consequence of the facility with which it is procured. Its peridermis is brown, or of a blackish grey or slate colour (a colour which, I may observe, appears to be common in all the cinchona barks which are developed under the influence of the wind and sun), upon which the pale lichens which cover it are grouped with much elegance. As this bark adheres strongly to the wood, it is but imperfectly separated, and therefore its internal surface is often broken.

Another kind of bark furnished by the *Ichu cascarilla* was shown me in Peru, which is obtained, not from the trunk or branches, but from the larger roots, or rather from the stumps; and it is possible that this variety will, one day, become valuable, notwithstanding that there are some difficulties in the way of collecting it; for not only does it form a mine which has not yet been worked, but it appears also to furnish a product superior to much of that at present employed.

This bark is in short pieces, flat, undulated, or more or less contorted, deprived of the peridermis, fibrous, or nearly smooth on the inner surface, very slightly cellulous on the exterior, of a uniform ochreous yellow colour, freely bitter, but less so than good calisaya bark, of which it presents the character with regard to internal structure.

The increasing scarcity of Calisaya bark induces the Cascarilleros constantly to mix the barks of several of the cinchonas; and this fraud is effected much more successfully than it was formerly, and without much experience it is sometimes difficult of detection. The admixture is made especially with the barks of *Cinchona Boliviana* and *cinchona ovata*, var. *rufinervis*,—or more rarely, not only on the coast, with the bark of C. *scrobiculata*; in other words, with the barks which M. Guibourt calls, with much justice, *the light calisaya of commerce.* With the bark of scrobiculata it would not be likely to be long confounded; but it may readily be so with the two first; so much is this the case that in Bolivia the bark of C. *Boliviana* is also called *calisaya bark*, a name which its properties will, at any rate, justify. The best characters by which to distinguish the true calisaya from all the other species are, the shortness of the fibres, which entirely cover the surface of its transverse fracture, and the facility with which these are detached, instead of remaining adherent and pliant, as is the case with *rufinervis* and *scrobiculata.* Lastly, its uniform rufus colour, and its not being marbled throughout its thickness with white, sufficiently distinguishes it from C. *Boliviana.*

Added to these characters, its great density (which is such that on drawing the nail across its internal surface it produces a bright mark), the depth of the furrows, and their projecting edges, are generally sufficient to distinguish the flat calisaya from all the other barks with which it may be found mixed. As to the rolled calisaya, it is much more difficult to distinguish it, for not only does its peridermis, in its physical characters, much resemble that of many other species, especially that of *scrobiculata* and *rufinervis*, but the fracture does not here present such clear characters as it does in the older barks. If even a microscope be used in the examination, the characters are very slight by which it may be recognised; such, for instance, as a slight excess of thickness in the peridermis, and a larger resinous circle, taking into the account, be it understood, the degree of bitterness which, in doubtful cases, is certainly the most sure method that can be employed to decide the question.

Some idea may be formed of the immense consumption of this bark from the fact that the Bolivian company annually export, free from adulteration, more than 4,000 quintals, or 200,000 kilogrammes. It is difficult to conceive that the forests can long supply such a demand: the quantity of bark afforded by a tree of *Cinchona calisaya* necessarily varies much. One of the most prolific trees may yield from 60 to 80 kilogrammes of dry bark. A tree of 10 yards in height, and with a trunk of 8 inches in diameter, yields about 9 or 10 kilogrammes.

The company of La Paz purchase it at an average price of 20 piastres (100 francs) the arobe, delivered at that depôt; and in the neighbouring province of Carabaya, in Peru, where there is no

monopoly, the price is 40 piastres: on the coast the price is about double this sum."

Qualities. — Yellow bark has nearly the same odour in decoction as the pale; the taste is more bitter, but less austere, and it does not afford any astringent feeling to the tongue when chewed. The internal colour is golden cinnamon, or subdued orange-yellow, becoming, when moistened, a lively orange. The fracture is woody and fibrous, presenting, when examined by a lens, the appearance of parallel, longitudinal, needle-like fibres, with a dry, agglomerated powder in the interstices, of a yellow colour. It is easily reduced to fine powder, and the powder preserves the colour of the bark, but is brighter. Guibourt has proposed the following method of distinguishing this bark when in quill from red bark: —Pulverize a little of the bark, and triturate the powder in a porcelain mortar with water, and filter; then to the filtered fluid add some crystals of pure sulphate of soda: a white precipitate will be thrown down if the specimen be true yellow bark. The sediment, which the infusion lets fall in cooling, is of a brighter colour than the dry powder. The filtered aqueous infusion has a pale golden hue, with a shade of red; is clearer, and seemingly less mucilaginous, than the former: it has all the bitterness of the bark, reddens litmus paper, and precipitates solution of galls; but the precipitate does not fall so instantaneously as in the infusion of the former species. With solution of gelatine a pinkish-yellow precipitate is produced: acetate and diacetate of lead throw down a precipitate; and tartarized antimony one more copious than that which the pale bark affords. A solution of sulphate of iron changes its colour to a bluish-green, and, after many hours, gives a precipitate of the same hue. The ethereal tincture has a golden colour, affords resin when evaporated, and is affected by the same re-agents as that of the pale cinchona; but the water on which it is evaporated is less highly coloured. The alcoholic tincture appears to be in every respect the same as that afforded by the pale bark. It appears to agree in most of its properties with the first species examined by Vauquelin; which he states was brought to Spain in 1788, and, owing to its having been used for the royal family, got the name of royal cinchona; but the real *China regia* is unknown, or at least rare, in English commerce. Yellow bark owes its febrifuge properties to *Quina*, which is in the form of a *super-kinate.* It contains, also, *kinate of lime, red cinchona, soluble red colouring matter, yellow colouring matter, fatty matter, starch,* and *lignin.* [1] Thiel procured from the flat bark 2·3 per cent. of *Quina,* and 0·08 of *Cinchonia :* Michaelis procured no *Cinchonia,* but 3·7 per cent. of *Quina* from the flat, and 2·0 from the quilled: Von Santen, 2·0 of *Quina* from the flat, with a

[1] *Pelletier, Dict. Mat. Med.* v. p. 603.

trace of *Cinchonia:* Witstock obtained 3·0 per cent. of *sulphate of Quina*, and 0·12 of *Cinchonia.*[1] The average quantity of *disulphate of Quina* procured from one pound of this bark is about four drachms.

The following are the characters of the yellow bark, according to the London College:

"Thick, covered for the most part with very fine sharp fibres, either flat or quilled; the latter has the outer surface either grey or brownish, wrinkled longitudinally, split transversely with deep cracks, or compassed round with them. The former is frequently denuded, and of a brownish cinnamon colour. Taste very bitter. From a pound of this bark, by means of sulphuric acid, about three drachms of disulphate of Quina should be obtained."

Several other barks, besides those which I have described, are known in the commerce of the Continent, and are occasionally found in that of our own country; but they are rare, and do not require to be particularly noticed.[2]

3. RED BARKS.

Officinal. CINCHONA RUBRA, *Lond. Edin. Dub.* Bark of an undetermined species of Cinchona.

Syn. Quinquina rouge (*F.*), Rothe Chinarinde (*G.*), China (*I.*), Quina roxa, Quina colorada (*S.*), Quina Vermetha (*Port.*).

The tree yielding this bark, — the *China rubra*, or *Rothe China* of Bergen; *Quinquina rouge* of Guibourt; *China rubra* of Goebel; and *Cascarilla colorada* of the Spaniards, — is undetermined; although the bark was known at an early period, and was described by Dr. Saunders in 1782[3], some years after a cargo of it had been captured by an English frigate. It is assuredly not C. *oblongifolia*, which was discovered by Mutis near Marimita, in 4° North lat., at an elevation of 4000 to 8500 feet, and to which tree it was formerly referred by the London and Dublin colleges. It is named in the vernacular Spanish, *Palo de regueson*, and *Cascarilla de flor de Ahazar*, from the flowers resembling in odour those of the orange. Its bark is the *Quina Roxa;* and is erroneously supposed to be the *Cascarilla colorada* of commerce. The bark of C. *oblongifolia* is certainly not the red bark known as such in this country. Von Bergen has satisfactorily proved that it bears no resemblance to the ordinary red bark; and both Ruiz and Pavon assert that although they are ignorant of the source of our red bark, yet that it is very different from the red bark of Santa Fé,

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[1] *Geiger.*

[2] Those who desire an account of them may consult *Pereira's Elem. of Mat. Med.* vol. ii. p. 1374 to 1421.

[3] *Observ. on Red Peruvian Bark.*

which is that of the C. *oblongifolia,* and contains little of either of the alkaloids, on which the goodness of the Cinchona bark depends.[1] It was supposed by Condamine to be the bark of the larger branches of the same tree which yields the pale bark. Some of the red Cinchona barks appear to be derived from the Cinchona nitida[2] (Ruiz and Pavon). The genuine red bark arrives in this country from Peru in chests, which contain from 100 to 160 lbs. each. It is never brought in serons. It consists of various sized pieces, quilled and flattish, covered with a thin and rough, entire, reddish-brown epidermis, with wavy, longitudinal wrinkles, occasionally elevated into long warts, friable, and of a granular consistence.[3] In some instances the epidermis is covered with whitish-grey lichens; namely, *Opegraphæ, Graphides, Thelotrema, Pyrenula, verrucarioides,* Verrucara *sinapisperma,* and Lecidia *consperma.* The greater number of the pieces are flat; but some are quilled, and others partially quilled, as if taken from half the circumference of the branches to which they belong. The quills vary in diameter, from two lines to one inch and a quarter, and the bark itself in thickness is from one-third to two lines: that of the flattish pieces, which are segments of a cylinder, is from one-third to three-fourths of an inch. The pieces vary from a few inches to nearly two feet in length. Under the epidermis, which is of a rust-grey hue, and cracked with furrows almost penetrating to the bark, there is an intermediate layer, which is dark-coloured or brownish-red, compact, brittle, and seemingly resinous, but less bitter than the inner bark: and within it the internal part is woody, fibrous, and of a rust-red, sometimes yellowish colour. The fracture, examined by a lens, consists of close, longitudinal, parallel, needle-form fibrillæ of pale red or red fawn-colour, with a deep red agglomerated powder in the interstices. The powder is of a deeper colour than the internal part of the bark, namely, a dull brownish-red hue.

Qualities. — Red cinchona bark has a weak peculiar odour, not unlike that of tan, or earthy; and its taste is bitter and slightly aromatic, but more austere than that of the barks of the other species. The aqueous infusion has a pale ruby colour, a slight degree of bitterness, and a decided astringency. It lets fall a sediment of a brighter hue than that of the dry powder. It reddens litmus paper[4], is slowly precipitated by the solution of

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[1] A portion of the bark of C. *oblongifolia* in my possession bears no resemblance to the red bark of the Pharmacopœias. It is said to be the Cinchona *nova* of Continental pharmacologists.

[2] *Weddell, Histoire Naturelle des Cinchonas.*

[3] Guibourt divides the red barks into quinquina rouge verruqueux and quinquina rouge non verruqueux.

[4] Fourcroy found in it a portion of citric acid, some hydrochlorate of ammonia and chloride of calcium.

galls, the supernatant liquor being perfectly colourless; and a very slight, flocculent, ruby-coloured precipitate is produced by the solution of gelatine. It is scarcely altered by tartar emetic, more so by the diacetate and acetate of lead: the protosulphate of iron makes it assume a deep olive-green colour, but little precipitate falls. The ethereal tincture is of the same colour, and exhibits the same appearances as that of the Crown bark, when treated in a similar manner. The alcoholic is of a very deep brownish-red colour; when diluted with water, a red flocculent matter falls down; and it precipitates the solutions of sulphate of iron, and of tartar emetic, the former of a black olive-colour, and the latter red. It contains *cinchonia* and *quina,* combined with kinic acid. Its components, according to Pelletier and Caventou, are *superkinate of cinchonia, superkinate of quina, kinate of lime, red cinchonic, soluble red colouring matter, yellow colouring matter, fatty matter, starch,* and *lignin.*[1]

According to the experiments of Pfaff, many specimens afford only 1·7 per cent. of cinchonia, and 0·44 of quina; others so much as 3·17 of the former, and 0·15 of the latter. Pelletier and Caventou found 0·8 of cinchonia, and 1·7 of quina![2] Michaelis obtained from ℔j. of it, 32 grains of *cinchonia* and 64 of *quina.* Goebel and Kirst from flat pieces 65 grs. of *cinchonia* and 40 of *quina.*

This bark was described by Don Sebastian Josef Lopez Ruiz, in 1778.[3] It possesses powerful astringent properties; consequently its use is contra-indicated in inflammatory and bilious affections: but the Spanish physicians regard it as highly beneficial as an external application in suppurating and sphacelating ulcers. An extract prepared from it is much used in Spain, in putrid fevers.

According to the London College this bark has the following properties:—

"Thick, either flat or quilled, externally rough with wrinkles, furrows, or warts, reddish brown, or of a chestnut-brown colour; taste bitter."

The following table from M. Weddell's work contains a list of the different varieties of barks, and their sources:—

TABLE OF COMMERCIAL CINCHONA BARKS, with the botanical Species from which they are believed to be obtained. (Taken from extract of Weddell's *Histoire Naturelle des Quinquinas,* in *Pharmaceutical Journal,* vol. ix.)

1. GREY CINCHONA BARKS.

1. Loxa Cinchona barks (Crown bark, *Angl.* China Loxa, Kron China, *Germ.*).

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[1] *Journ. de Pharm.* vii. 92.

[2] *Geiger.*

[3] From some remarks of Ruiz, there is reason for thinking that the red bark is the bark of the same tree which yields the pale bark, but taken from larger branches, confirming the opinion of Condamine.

Loxa Cinchona bark, grey, compact	*Cinchona condaminea*, H. et B.
Loxa Cinchona bark, brown, compact. (*Dunkele Ten. China*, Germ. *China pseudo-Loxa*, Bergen.) Loxa Cinchona bark, red chestnut. Light Calisaya	Cinchona scrobiculata, H. et B.
Loxa Cinchona bark, red fibrous, of the King of Spain. (Quina estoposa, Pav. in collect. Lamb. Mus. Brit.)	
Loxa Cinchona bark, yellow fibrous	*Cinchona macrocalyx*, Pav.

2. Lima or Huanuco Cinchona barks. (Silver bark, grey bark, *Angl.* China Huanuco, Graue China, *Germ.*).

Lima Cinchona bark, grey brown. (*Cascarilla provinciana*, Peruv.) Lima Cinchona bark, grey ordinary	C. *micrantha*, Ruiz et Pav. or C. *lanceolata*, Ruiz et Pav.
Lima Cinchona bark, white	? C. *purpurea*, Ruiz et Pav.
Lima Cinchona bark, very rugous, resembling the Calisaya bark *Cascarilla negrilla*, Peruv. (? *Cascarilla lagartijada*, Laubert)	C. *glandulifera*, Ruiz et Pav.
Cinchona bark, red, of Jaen or of Loxa -	- ?

2. Red Cinchona Barks.

(Red bark, *Angl.* Rothe China, *Germ.*)

Red Cinchona bark, becoming white in the air	- ?
Red Cinchona bark of Lima Red Cinchona bark, true, non-verrucous. (*Cascarilla roja verdadera*, Laubert) Red Cinchona bark, officinal Red Cinchona bark, true, verrucous	C. *nitida*, Ruiz et Pav.
Orange-red Cinchona bark, verrucous Pale-red Cinchona bark, with a white surface Brown Carthagena bark Red Carthagena bark	?

3. Yellow Cinchona Barks.

Yellow Cinchona bark of the King of Spain, (*Cascarilla amarilla del rey.* Laubert). Calisaya Cinchona bark, or Royal yellow bark, (König's China, Germ. *Yellow bark*, Angl. (*China regia*, Bergen).	C. *calisaya*, Wedd.
Orange-yellow Cinchona bark. Cinnamon Cinchona bark (*Quinquina cannelle*). Light Calisaya (*Cascarilla claro-amarilla*, Laubert).	C. *micrantha*, Ruiz et Pav.
Pitaya Cinchona bark (*Quinquina de la Colombie ou d'Antioquia*, Guib. Hist. Nat. des Drog. *Cascarilla parecida à la Calisaya*, Laubert). Woody Carthagena bark (*Quinquina de Colombie ligneux*)	C. *condaminea*, H. et B.

Orange Cinchona bark of Mutis (*Spongy Carthagena bark; New Spurious Yellow bark*, Pereira).	C. *lancifolia*, Mutis.
Huamalies Cinchona Bark (Rusty Bark, *Angl.* China Huamalies, Braune China, *Germ.*)	
Huamalies Cinchona bark, dull grey	C. *hirsuta*, Ruiz et Pav.
Huamalies Cinchona bark, thin reddish	? C. *purpurea*, Ruiz et Pav.
Huamalies Cinchona bark, white - -	?
Huamalies Cinchona bark, ferruginous	C. *micrantha*, Ruiz et Pav.
Yellow Cinchona bark of Cuenca - -	C. *ovatifolia*, H. et B.

4. White Cinchona Barks.

Ash-coloured Loxa Cinchona bark (*Ash bark*, Angl. *Blasse Ten China*, Germ. *China Jaen.* Bergen.). Grey Cinchona bark, pale ditto White Loxa Cinchona bark White fibrous Jaen Cinchona bark	C. *ovata*, Ruiz et Pav.
Cuzco Cinchona bark Arica Cinchona bark	C. *pubescens*, Vahl. or C. *cordifolia*, Mutis.
Pale-yellow Carthagena Cinchona bark (*Hard Carthagena bark*, Angl. *Quina amarilla*, Mutis. *China flava dura*, Bergen.). Orange-yellow Carthagena Cinchona bark (*Quinquina de Maracaibo. China flava fibrosa*, Bergen.).	Ibid.
Pitayon Cinchona bark, or False Pitaya Cinchona bark	?

The following, according to M. Guibourt, are the most active barks:—

1. Calisaya Cinchona bark
2. Yellow-orange „
3. Pitaya „
4. Verrucous true red „
5. Non-verrucous true red Cinchona bark
6. Red Lima bark
7. Grey Lima bark
8. Verrucous white Huamalies bark

(Weddell, *Hist. Naturelle des Quinquinas*, fol. 1849).

All the Cinchonas, as already mentioned, are mountainous trees, growing seldom lower than 975 toises above the level of the sea. Those are richest in the alkaloids which are found in the most elevated situations: the Cinchonas of Peru are generally the richest in Cinchonia; those of Bolivia and La Paz in Quina. Those species, the corolla of which is downy and pink, furnish the largest quantity of both the kinates: those which have smooth and white corollas, the smallest quantity. No inference can be drawn from the smooth or the downy character of the leaves.[1]

[1] The hard Carthagena barks—namely, C. *cordifolia* of Mutis, the *brown Carthagena bark*, C. *oblongifolia*, and the bark of *Santa Martha*,—contain much less of the alkaloids than the Peruvian barks.

The goodness of all the species of Cinchona depends on the proper age of the branches that are barked.

The Cinchona barks occasionally vary in their powers, and are often mixed with other inferior barks, even by the bark peelers (*cascarilleros*) who gather them. This arises either from ignorance, or from a fraudulent desire of more quickly completing their contracts[1]; it is, therefore, of importance to be able to distinguish good bark, and the best varieties from those of an inferior description. Mutis informs us, that the old trees furnish the best bark; and that the bark taken from the trunk and the thicker branches is superior to that from the younger branches. The following directions for choosing bark are those generally attended to in Peru[2]: the essential characteristics are *colour, taste*, and *smell;* the secondary, or accidental, are *exterior coat, fracture, weight, thickness*, and *quill.* The best yellow bark is of an orange-yellow colour; and the goodness decreases as the colour varies from this to a very pale yellow. When of a dark colour, between brown, red, and yellow, it is always to be rejected; as this colour designates either that it is of a bad species, or that it has not been well preserved from the air and moisture. This dark colour, however, must not be confounded with a cinnamon red colour in the inside, which is seen in the best bark. The colour of course varies according to the kind of bark. The *taste* of Cinchona bark should be bitter, but not nauseous, nor very astringent, with a slight agreeable acidity just perceptible to the palate; and, when chewed, it should not separate in threads of much length. The *odour* of any of the barks is not very strong: but, when they have been well cured and preserved, it is always perceptible; and the stronger it is, provided it be pleasant, the better may the bark be considered. The appearance of the *coat* or epidermis has led to mistakes. It is, in many instances, merely accidental; depending on the variation in the height of the ground, and the exposure of the branches to the sun and air, and the lichens that cover it. Seven distinct appearances of the epidermis are remarked; 1. Negrilla, Dark silver coat[3]; 2. Crespilla, short curled; 3. Pardo-obscura, dark open leopard grey[4]; 4. Pardo-clara, light open grey[5]; 5. La-

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[1] Humboldt says, "We saw at Peru the barks of two new species of Weinmannia and Wintera mixed with those of Cinchona."—*Personal Narrative*, vol. v. p. 769. Trans.

[2] Extracted from a MS. of *Don Felix Devoti*, a respectable physician at Lima, who had practised there upwards of twenty-five years.

[3] This bark is occasionally found amongst the pale cinchonas sent to England. It is easily distinguished by its spotted surface. Ruiz says it must be ranked among those of a middling quality.

[4] This is found in the pale bark of the shops; when it is present the bark is regarded as of middling quality.

[5] This is a very rare aspect of bark, and is that of the C. *fusca* of Ruiz. It is called *Asmonich* by the natives of Puzuzu and Muna, where it is found.

gartijada, fine dark silver, lizard-coloured[1]; 6. Blanquisima, very pale[2]; and 7. Cenicienta, ash-coloured. The first three are the best, and belong to barks produced on the highest mountains; the others rank in the order of their arrangement; the epidermis being always cracked and rough in proportion as the trees have been exposed to a scorching sun. With regard to *fracture,* some of the worst barks break even and clean as if cut with a knife, and some of the best have always a more or less splintery fracture.[3] The fibres of the fracture being sharp but short, indicate the bark to have been gathered from mature branches; the long, tough, and thread-like from immature branches. The best barks are generally observed to be the heaviest. In point of *thickness,* very thin bark is inert, owing to the branches from which it was taken having been too young; and very thick bark, particularly if it break like common wood, argues that the tree must have been sickly; yet bark exceeding two lines in thickness may be good: for although it is disapproved of at Cadiz, under the name of *quinon,* yet excellent effects have resulted from much thicker bark in England. The moderately thick and firm bark is always preferred at Lima.

We subjoin M. Weddell's remarks on the mode of estimating the value of bark, extracted from his work before alluded to, and contained in the Pharmaceutical Journal, vol. ix.

"The division of the Cinchona barks into the several varieties of *grey, yellow, orange, red,* and *white,* is well known. This classification is very defective, and has doubtless only been retained on account of the apparent simplicity in its application. Based on a characteristic such as colour, it possesses in a great degree the defects of artificial arrangements, without partaking of many of their advantages. Not only does it separate the products of the same tree, but it connects those which are essentially different. Formerly it was thought that all the *grey* Cinchonas were furnished by the same species, and many persons at the present time are of this opinion. But not only are they produced by many different species, but very frequently they are the young bark of the same trees, which yield the yellow and red Cinchonas. A more useful, and indeed more natural, method of classification, would be one founded, in the first instance, on the chemical composition of the barks: it would then be only necessary to study their active principles, such as quinine, cinchonine, and tannin. But the results obtained by this method, although satisfactory in theory, would not by any means be so in practice, on account of the unavoidable

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[1] The bark with this coat has the greatest affinity with the *yellow* bark of the shops. It is a good kind of bark.

[2] This bark is little valued in Spain, and is seldom met with in commerce.

[3] The idea of a resinous fracture being the characteristic of good bark originated when the virtue of bark was supposed to depend on the resin it contained.

difficulties arising from such a mode of classification; and also from the fact, now fully proved, that the same botanical species furnished barks varying greatly, according to accidental circumstances.

If, then, a classification be absolutely needed, one which could be based on the anatomical structure of the bark would be found to be of far greater utility than either of the preceding, inasmuch as we shall find existing, even in the cinchonas, a certain relation between the structural and chemical characters.

The following are the data which my researches on the subject have furnished me with:—

1. If a large piece of the *Cinchona Calisaya* met with in commerce be attentively examined, it will be found that the exterior surface is entirely deprived of its peridermis, and presents broad superficial furrows, short, more or less confluent [1], and divided by projecting ridges, the bases of which are of a fibrous texture, similar to the inner surface of the bark or of the layer which is immediately in contact with the wood. The examination of a transverse section shows that the texture of this bark is homogeneous, and composed of ligneous fibres of almost equal thickness, uniformly distributed in the midst of cellular tissue, gorged with resinous matter, tissue, which may be said to isolate each fibre, being interposed in thin layers between them. Finally, when these fibres are examined longitudinally, we find that they are short and fusiform, and that their cut extremities are but loosely attached to each other, and are sometimes completely separate, and appear to float in the midst of the cellular tissue which surrounds them.

2. If we take a similar piece of the bark of *Cinchona scrobiculata*, we shall find that, instead of these furrows of fibrous texture, which so well characterises the *Cinchona Calisaya*, the exterior almost presents a smooth surface of a cellular texture, traversed here and there by slight linear indentations, the inner surface being, as in the preceding bark, of a fibrous texture. In the transverse section the fibres are more numerous than in the *Cinchona Calisaya*, especially towards the inner surface; but they lessen in numbers rapidly near the exterior, and the outermost layer is entirely without them. These fibres, if examined in a longitudinal section, will be found

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[1] These furrows are about the size of the fingers of the hand, and much resemble the impression which would be made if the tips of these members were drawn irregularly over a soft paste. These might be named the digital furrows. The Spaniards call them *conchas*, from the great similitude existing between the furrows on this species of bark, and those found in certain varieties of shells. They are more numerous and of greater depth as the bark becomes older, and there occurs successive exfoliations of scales from the surface of the liber; scales which ought to be considered part of the liber itself, or more frequently, as it appears to me, as a partial reproduction of the cellular coat. However this may be, after some little time, these layers of fibro-cellular tissue, in which the medullary rays do not penetrate, the circulation being, no doubt, insufficient, become enlarged, and thus add to the thickness of the peridermis.

to be of nearly double the length of those of the *Cinchona Calisaya*, and their extremities are invariably attached one to the other, their ends being by this means more elongated.

3. If we study, with equal attention, the bark of *Cinchona pubescens*, we shall there find a peculiar structure. The external surface somewhat resembles the preceding bark, with the exception of a slight whitish marbling, formed by the continuity of the peridermis, and scissures which may result from desiccation. The internal surface is fibrous, as in the preceding barks; but a transverse section shows us that it is principally composed of cellular tissue, in which the fibres form but a small number of irregular and concentric series in the interior half of the bark; and that which draws attention at the first glance is the size of these fibres, each one being three or four times as large as those of either of the former varieties; the result being that several of them are attached and united together in bundles, which may be fully proved by the examination of a longitudinal section of this bark.

As may be perceived, we have only spoken of cinchonas which have been deprived of their peridermis, because it is in this state that they are now usually met with in commerce. If perchance they were again to be used with their natural coating, it would afford additional means whereby to distinguish them, but would not in any way affect those of which we have just treated; for nothing would be easier than to remove the peridermis and to expose the surface beneath. Be this as it may, the structure of all the *cinchona* barks, more or less, resemble one or other of the three types we have spoken of, and, on this plan, there might be formed, without much difficulty, a series of groups comprehending all the known cinchonas. The purpose, however, in noticing these peculiarities, has been to facilitate the comprehension of a very important fact in the diagnostics of the different kinds of cinchonas; that of the vast difference they present in their mode of fracture. However singular it may, in the first instance, appear to be, it is easy to prove that, to a certain extent, the chemical composition of the bark operated upon may be determined by its mode of fracture; or, more properly speaking, there exists a relation between the chemical and the anatomical characters of the cinchonas, this being constantly proved by a particular form of fracture: *smooth* or corky where it divides the tunic or cellular covering of the bark; *fibrous, stringy,* or *woody* in those cases where it has affected one or other of the three forms of liber before described. Another fact, which is now fully proved, is, that the bark containing the largest proportions of quinine, is that of the *Cinchona Calisaya;* and experience has shown us that, after the *Cinchona Calisaya,* the barks possessing it in the greatest quantities are precisely those the structure of which most resembles this bark; for instance, those in which the dermis is reduced to a single liber by the successive exfoliations of

the outer tunics, or at least by their adjunction to the peridermis. On the other hand, experience seems to have shown, to a certain extent, that the grey cinchonas (which we have generally found to be the young barks of other species) contain a larger proportion of cinchonine than of quinine: we also know that many old barks which have retained the cellular coating they had when young yield a proportionally larger quantity of cinchonine; from which circumstance we may conclude that quinine is contained in the liber, or, more correctly speaking, in the cellular tissue interposed between the fibres of the liber[1], and that the cinchonine is principally found in the tunic or cellular coating. As to the tannin, it is found in larger quantities in this latter part than in the fibrous tunic; a fact which is easily determined with reference to the fresh bark where the exterior layers of the derm are more styptic than the internal layers. Thus the more the surface of a transverse fracture of a cinchonine presents a corky character, the more cinchona we may presume it contains; when, on the contrary, it presents a fibrous character, we may expect to find in it a larger proportion of quinine. In other terms, it is more than probable that a cinchona will afford a good product, — 1st, if it presents much conformity in the texture of the different layers of its derm; 2dly, if the relation of the fibrous and cellulo-resinous elements of the liber are equal; and, 3dly, if the fibres composing this latter layer are short and independent of one another, either laterally or longitudinally.

Analytical examinations. — These have been made with the view of discovering on what principle the febrifuge properties of the cinchona barks depend, and chemists well qualified for the task have engaged in it. In giving a short history of their trials, we need not go further back than the discovery of Dr. Duncan in 1803, which I shall presently notice. Vauquelin published some experiments upon cinchonas in 1806. He divided all the different species into three sections, according to their chemical properties.[2] The first comprised those which precipitate tannic acid, but not animal gelatine; the second, those which precipitate gelatine, but

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[1] It might appear from this, that the more abundant the cellular tissue is in the liber, the greater is the quantity of quinine contained therein; but such is not the case. Indeed, when the cellular tissue intermixed among the cortical fibres is increased beyond a certain degree, as is the case in the *Cinchona pubescens*, the liber then seems to assimilate to the cellular tunic, both in its properties and in its anatomical structure. The reverse of this proposition is, on the contrary, perfectly true; that is to say, the greater the number of fibres in the liber, the closer they are, and consequently the less mixed with the cellular tissue, as in *Cinchona serobiculata* and *Cinchona amygdalifolia*, in which cases there is also less quinine found. The density of the fibres themselves is such that we cannot suppose them to contain any notable quantity of the precious alkaloid.

[2] He examined seventeen different kinds, but was not able to ascertain the names of the trees from which they were obtained; and it is probable that some of them were not cinchona barks.

not tannic acid; and the third, those which precipitate at the same time tannic acid, gelatine, and tartar emetic. He conjectured, that on the principles producing these effects, particularly that principle which precipitates infusion of galls, the febrifuge properties of the barks depend, and that they are more or less febrifuge, in proportion to the quantity of these principles that are present. He asserted that the principle which precipitates tannic acid is of a brown colour and bitter taste; is less soluble in water than in alcohol; and that it also precipitates tartarized antimony, but not glue.[1] He imagined that it possessed some analogies with the resinous bodies, although it furnished ammonia on distillation; whilst the principle which, in some cinchonas, precipitates glue, has a bitter and astringent taste; is more soluble in water than the principle which, in other kinds, precipitates tannic acid: it is also soluble in alcohol, and does not precipitate tartar emetic.[2] Reuss of Moscow, along with a red matter, which he named *red cinchonic*, procured a bitter principle, probably *Quina;* but Dr. Duncan, jun., first suggested that the precipitate formed with infusion of galls must be a peculiar vegetable principle, and he named it *Cinchonia*. Dr. Gomez of Portugal afterwards verified this supposition by procuring that principle in crystals, by acting upon the aqueous infusion, and the alcoholic extract of pale bark, with *Liq. Potassæ:* he regarded it as analogous to resin. Laubert also, who procured it by another process, regarded it as *white resin.* Fabroni conceived that he was authorized in concluding from his experiments, that " the febrifuge virtue does not belong essentially and individually to the astringent, the bitter, or any other soluble principle, as the quantity of these increases by long boiling, while the virtues of the decoction decrease. He also contended that the febrifuge virtue does not reside in that principle which destroys the emetic property of tartarized antimony, and precipitates iron, since the decoction contains more of it than the infusion, while its virtues are evidently less."[3] It was concluded from these doubts, and many others that had been raised, that much was yet to be done before the principle of Cinchonas effective in the cure of fevers could be ascertained, and time has displayed the truth of this opinion.

The analyses of the Cinchona barks which first truly developed their active principles were those of MM. Pelletier and Caventou.[4] I may here again state that the following are the components of

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[1] The effect of this principle was first noticed by Dr. Maton; and soon after by Seguin, who immediately concluded that it was gelatine; but this opinion was proved to be erroneous by Dr. Duncan, jun., who found that it was a principle sui generis, and named it *cinchonia.* — Vide *Nicholson's Journal,* vii. 226.

[2] *Ann. de Chim.* l. c.

[3] *Edin. Med. and Surg. Review,* vol. ii. p. 338.

[4] *Journ. de Pharm.* vii. 49.

the three officinal species:—1. In *pale bark* is found *super-kinates* of *cinchonia* and of *quina*, a *green fatty matter*, a *red, nearly insoluble colouring matter*, namely, *red cinchonic*, discovered by Reuss; *a soluble red colouring matter; tannic acid;* a *yellow colouring matter*, detected by Laubert; *kinate of lime; gum; starch;* and *woody fibre.* 2. The components of *yellow bark* are, *super-kinates of quina and cinchonia*, a *deep greenish-yellow fatty matter, red cinchonic, tannic acid, yellow colouring matter, kinate of lime, starch,* and *woody fibre.* 3. *Red bark* contains *super-kinates of cinchonia and of quina* in large quantity, and more *tannic acid* than either the pale or the yellow barks. Pelletier and Caventou have added to these components *kinovic acid*, which they found in the red *cinchona* of Santa Fee, C. *nova.*[1]

Kinic, Cinchonic, or Quinic Acid.—This acid can be obtained from the kinate of lime, which is formed when a salt of lime is added to a watery solution of any of the Cinchona barks, by decomposing it with sulphuric or oxalic acid. When pure, it occurs in the form of crystals (difficult to procure), which are rhombic prisms, colourless and transparent, very soluble in water and alcohol, the solutions having a sour taste and strong acid reaction. The formula for kinic acid is $C_{14}\,H_{11}\,O_{11} + HO$. By the action of some oxidising agents a crystallisable body *Kinole* or *Kinoile* is obtained.

Red Cinchonic.—This is a red or brownish, very insoluble matter, soluble, however, in hot alcohol, precipitates tartar emetic, but not gelatine; it is supposed to be a species of altered tannin.

Kinovic Acid, found in Cinchona Nova, appears to have characters not unlike those of stearic acid.

Quina.—This alkaloid may be obtained by precipitating a solution of the disulphate (for preparation of which see Part III.) with an alkali, and collecting the precipitate. As thus procured, it is amorphous, but may be crystallised, though with some difficulty, from an alcoholic solution, by slow evaporation. It forms silky needles of pearly lustre. It is slightly soluble in cold, and more so in boiling, water, very soluble in alcohol, soluble also in ether, and in the essential and fixed oils with the aid of heat. It is dissolved by lime water and chloride of calcium, by ammonia and its carbonate (hence care should be taken in precipitating the alkaloid with ammonia that excess be not used), but not by potash and soda. It may be heated until it fuses without undergoing decomposition. Quina forms crystalline salts with most of the acids which are very slightly soluble in water. It is precipitated from solution by tannic acid. Quina and its salts may be distinguished from other vegetable alkaloids by the beautiful green colour which

[1] *Journn. de Pharm.* vii. 109.

is produced when chlorine, water, and ammonia are added in succession: the production of the green tint is given in the "London Pharmacopœia" as a test for this alkaloid. If instead of ammonia a concentrated solution of ferrocyanide of potassium be added after the chlorine, a dark red colour is said to be produced; and if potash be used in place of ammonia the solution turns of sulphur yellow colour. These reactions are restricted to this alkaloid.

The composition of Quina is represented by the formula C_{20} H_{12} N_1 O_2. (Muriate of Quina (*Dub.*) see Part III.) Besides the crystallisable quina, a resinous-looking substance is obtained by the manufacturers from the mother liquors to which the name *Quinoidine* has been given: its composition is identical with that of quina, of which it appears to be an amorphous variety: it is very insoluble in water, but freely so in alcohol and ether. It is soluble in dilute acids, being precipitated again by ammonia: its salts are all amorphous.

Cinchonia may be obtained in a manner very similar to Quina. This alkaloid very readily crystallises in beautiful four-sided prisms — much less soluble in water than quina, very slightly soluble in ether, but readily so in strong alcohol. It forms crystallisable salts, many of which are soluble in water. Lime water and chloride of calcium do not dissolve it. Its formula is C_{20} H_{12} N_1 O_1. Quina is more soluble in water than cinchonia; but the corresponding salts of cinchonia are, as a rule, more soluble in that menstruum than those of quina.

Aricina, an alkaloid obtained in a manner similar to the above mentioned, from the Arica bark. It is insoluble in water, but is dissolved by alcohol, ether, and ammonia. Nitric acid forms with it a dark green colour. Its formula is C_{20} H_{12} N_1 O_3.

These three alkaloids may be represented as different oxides of a base represented by C_{20} H_{12} N.

The proportion of the alkaloids, both absolutely and relatively, varies considerably in the different species of bark. Aricina has been found only in the Arica barks: its claims to be considered a distinct alkaloid are not well established.

Several methods have been proposed for estimating the amount of alkaloid contained in a given bark. The Edinburgh Pharmacopœia directs the decoction obtained from 100 grains of bark to be precipitated with a concentrated solution of carbonate of soda, and the precipitated mass which fuses in the mother liquor, to be weighed when cold. Another method has been recently proposed by M. Rebourdain, which consists in exhausting a portion of bark with acidulated water, and rendering the filtered solution alkaline with solution of potash. The whole is then well shaken with about one third of its bulk of chloroform, and allowed to stand for a short time; the chloroform, holding the alkaloid in solution, sinks to the bottom of the vessel: the supernatant fluid may be removed by

decantation, and, after washing once or twice the chloroform is evaporated, and the amount of alkaloid estimated from the residue.

The following mode is recommended by Mr. Tilloy: it consists in exhausting the bark with alcohol, filtering, and throwing down the colouring matter, kinic acid, &c. by acetate of lead, from the alcoholic solution. The insoluble matter is allowed to subside, and then filtered; the excess of lead removed by sulphuric acid, the solution filtered, and the alcohol distilled off. Acetate or sulphate, of the alkaloid, according to the quantity of sulphuric acid that has been added, then remains, from which a little fatty matter is separated by decantation, and the alkaloid precipitated by ammonia. As too much ammonia will retain it in solution, it is recommended to add a few drops of sulphuric acid, which will then cause it to be all precipitated.

Medical properties and uses. — Cinchona bark is a powerful and permanent tonic and astringent, possessing also antiperiodic powers. It is, undoubtedly, superior to all other remedies in counteracting febrile action, and restoring strength and vigour to morbidly weakened habits.

The stories which are related regarding the discovery of its febrifuge powers appear to be founded on fiction, and are unworthy of notice. The Peruvians, it has been supposed, were acquainted with its powers before the conquest of their country by the Spaniards, and from them the knowledge of it might have been acquired by their conquerors: and this supposition is supported by Ruiz and Pavon: but Humboldt renders it improbable, and says, that the use of the cinchona bark "is entirely unknown to the Indians in Loxa, Guaneabamba, and far around."[1] They even regard it as poisonous; and "in Malacatis only, where many bark-peelers live, they begin to put confidence in the cinchona bark."[2]

The most probable history of the discovery of the febrifuge virtues of cinchona is the following tradition, mentioned by Humboldt, in his Dissertation on the Cinchona Forests. The Jesuits, at the felling of the wood, had taken notice of the considerable bitterness of the cinchona, and "there being always medical practitioners among the missionaries, it is said they had tried an infusion of the cinchona in the tertian ague, a complaint which is very common in that part of the country;" and having found it succeed in curing the disease, began to employ it as a febrifuge.

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[1] *Humboldt on the Cinchona Forests;* in *Lambert's Illustrations of the Genus Cinchona.* Lond. 1821, 4to. p. 22.

[2] Humboldt says that the present people of South America have the most inveterate prejudices against the employment of the different kinds of cinchona; and in the very country where this valuable remedy grows, they try to cut off the fever by infusions of Scopara *dulcis*, and hot lemonades prepared with sugar and the small wild lime, the rind of which is equally oily and aromatic. — *Personal Narrative*, vol. v. p. 164. — *Trans.*

It was probably brought into Europe in 1632; at least so asserts Sebastian Badius, a Genoese physician, who espoused its cause, on the authority of D. Jos. Villerobel[1]; but it was, nevertheless, little known to Europeans, until the Countess of Cinchon, wife of Don Geronimo Fernandez de Cabrera Bobadella y Mendoza, Count of Cinchon, viceroy of Peru, who had been cured by it in 1638, recommended it, on her return to Spain, in 1640. Its fame soon spread, and it was taken to Italy in 1649[2], and through the means of Cardinal de Lugo and the Jesuits, who kept the origin of it secret, it was distributed over the Continent[3]; although its progress was for some time vehemently opposed by the medical profession. It was in repute in England in 1658: but owing to its high price[4], and some prejudices formed against it, it was very little used, till Talbot, an Englishman, again brought it into vogue by the many cures he performed with it in France, under the name of the *English remedy.*[5] His secret of preparing and exhibiting it was purchased by Louis XIV., and made public.[6] These circumstances throw light on the origin of some of the names by which it has been known: as *Cortex* and *Pulvis Comitissæ; Cortex* and *Pulvis de Lugo; Pulvis Jesuiticus* or *Pulvis Patrum; Arbol de la Cascarilla; Cascarilla della Oja; China, Corteza de Loxa; Cortex China de China,* and *Gentiana Indica.* It was called also, *Palo de Calenturas, Lignum Febrium, Fieberholz, Bois des Fièvres, Cortex Antiquartius, Corteccia della Febbre, le Poudre de Talbot,* and fever wood, on account of its effects; and, from the place whence it was brought, *Peruvian Bark.*

It was introduced into practice for the cure of intermittent fever. It was, as already stated, much opposed at first[7], but it soon ac-

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[1] *Sebastianus Badius, Anastasis corticis Peruviani, seu kina kinadefensio contra Chifletium et Plempium.* — Genuæ, 1663.

[2] The earliest printed treatise on the medical properties of Peruvian bark, with the exception of the *Schedion*, an Italian handbill printed in 1649, recommending it, and giving directions for exhibiting it, is that of *Jounnes Jacobus Chifletius*, entitled, "*Pulvis Febrifugus Orbis Americani*," 4to. p. 30. Anno 1653. Chifletius was physician to the Archduke Leopold William.

[3] Morton gives the above account on the authority of Bollus, a Genoese merchant' who had lived long in Peru, "autor fide dignus." — *De Feb. Intermit.* c. vii.

[4] Dr. Robert Strum of Antwerp, who was one of the advocates for its employment, informs us that it was sold at first by the Jesuits for its weight in silver; and at Brussels, in 1658, twenty doses of the powder were sold for sixty florins, to be sent to Paris (*Strumii Feb. Peruv. Vind.* Antwerp, 1659); yet Condamine relates that, in 1690, several thousand pounds of it lay at Piura and Payta for want of a purchaser. — *Mémoires Acad. Roy.* 1738.

[5] Talbot is noticed by Fontaine in his *Poëme du Quinquina*, for having cured the Prince of Condé, the Dauphin, and the minister Colbert with the bark.

[6] Talbot received 1600*l.*, an annuity of 80*l.*, a ten years' monopoly, and knighthood.

[7] Among others it was opposed by Chifletius in the work already noticed, owing to the time in which it was administered to his patron, the Archduke, preventing it from proving beneficial. This time was that ordered in the Schedion, "frigore febrili incipiente." It was opposed also in a tract, published in 1655, in defence of Chifletius, by

quired great celebrity; and it still retains its reputation as a remedy for that disease; although, owing to peculiar idiosyncrasies and other accidental causes, it has occasionally failed in this country in agues, which were afterwards removed by other remedies, particularly arsenious acid, and the arsenite of potassa. Some of these failures may, perhaps, have arisen from the kind of bark employed: for notwithstanding the generally received opinion, that all the kinds of bark may be indifferently used as antiperiodics, yet there is some reason for the assertions of the Spanish and the South American physicians, that they vary in other respects besides their degree of activity. By them the yellow bark[1], *Cascarilla Calisaya*, is considered as directly febrifuge; the pale bark, the *Corteza de Loxa*, and the *Cascarilla Provinciana* of the Spaniards, is indirectly so, but it is better fitted for curing agues: while the red, *colorada quina roxa*, is only fit to be used in cases of gangrene[2], as its use is apt to be followed with much nausea, severe vomiting, and insupportable colic.

The physiological influence of Cinchona is that of a topical stimulant, and a general tonic. The first of these properties depends on the tannic acid and red cinchonic, the second on the alkaloids contained in the bark. When taken into the stomach, cinchona bark excites, soon afterwards, a moderate sensation of warmth at the epigastrium; and, if the dose be large, nausea and vomiting sometimes follow; and purging is not an uncommon result of its administration. Its influence upon the vascular system is soon experienced by the pulse increasing both in frequency and in force: whilst, at the same time, the nervous system evinces that it is under the action of the medicine by a sensation of tension and slight fulness in the head; sometimes with a singing in the ears, and partial deafness. As an antiperiodic, its influence is displayed by its breaking the catenation of morbid symptoms which constitute the paroxysm of ague; but the manner in which this is effected, is still involved in obscurity. It is superior in this repect to any other vegetable tonic, and is only equalled by arsenious acid and its own alkaloids.

Melippus Protimus*, against one Honoratius Fabri, a French Jesuit, who called himself Antimus Conygius, and had ventured to extol the bark. It met with many opponents in England, also, from Alderman Underwood having died while using it, in 1658, and his death having been ascribed to the bark.

[1] According to Condamine, this was the bark first introduced into Europe. He says it yields by incision a yellow odorous resin; and that the Jesuits of La Paz (whence the best bark of this species is still obtained) used to gather it with care, and send it to Rome, where it was specific in agues. But the Loxa bark coming to Europe soon after, the three kinds were confounded together.

[2] *Zea, Ann. de Hist. Nat.* l. c. Rushworth discovered the efficacy of the red bark in gangrene.

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* Protimus was a feigned name: it was Vopiscus Fortunatus Plempius.

In *intermittent fever* the remedial influence of Cinchona, when these fevers are not complicated with visceral disease or accompanied by inflammatory symptoms, has long been undoubted. Some differences of opinion existed with regard to the best time of giving it, but these are now nearly settled. It was originally given in doses of ʒ ij, immediately on the attack of the paroxysms. Boerhaave[1] and others recommended that the fever should be allowed to run on for some time before it was administered; but a better practice is to give it as early as possible after the stomach and bowels are cleared by an emetic and a cathartic. Sydenham first proposed to administer it in the intermissions instead of during the paroxysms. Dr. Cullen recommended the exhibition of it in a large dose or doses immediately before the accessions[2]; but Morton's method of giving it directly after the hot stage of the paroxysm ceases, and repeating it in increased doses during the intermission, until the cold stage again returns, is more generally adopted. He and some others, however, gave it in every stage of the disease; and that it may be safely given during the paroxysm, was demonstrated in the practice of Dr. Clarke of Newcastle; but many stomachs are apt to nauseate it at that time. When it nauseates at other times, it should be combined with aromatics. Cinchona bark has also been found equally efficacious in other periodical diseases; namely, intermittent hemicrania and rheumatism; in dysentery and diarrhœa, catarrh, headaches, ophthalmia, and amaurosis, when they become intermittent; and in chorea, epilepsy, and some coughs under similar circumstances; indeed I have long regarded it as a maxim, that wherever intermission clearly takes place, there cinchona or its alkaloids will prove useful; it even prevents the continuance of those paroxysms of ague which form one of the constitutional symptoms of stricture of the urethra, and some other local affections; and which can be cured only by removing the strictures and other sources of irritation. The yellow bark possesses more energetic anti-periodic powers than the pale. When the stomach is too irritable to admit of the administration of Cinchona by the mouth, its antiperiodic effects are equally well obtained when it is exhibited per anum, or even applied to blistered surfaces, or its tincture rubbed upon the skin.[3]

In *remittent fevers*, cinchona, although less successful than in agues, yet is also found beneficial; but the excitement, particularly in the remittents of warm climates, requires to be previously subdued by blood-letting, and the bowels to be kept open. It renders the remissions distinct, and by degrees checks altogether the febrile action.

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[1] *Aphorismi*, &c. p. 767. [2] *Mat. Med.* vol. ii. p. 97.

[2] Dr. Alexander cured ague by the pediluvium of the decoction.—*Med. Obs. and Inquiries*, vol. ii. p. 242.

In the low stage of *continued fevers* of the typhoid type, particularly when these are attended with symptoms of great sinking and a tendency to gangrene, as in gaol-fever, cynanche maligna, scarlatina maligna, confluent small-pox, and in putrid measles, bark must be regarded as one of the most valuable remedies. The administration of it in pure typhus has been of late years judiciously delayed until the increased excitement of the brain is presumed to be subdued, and symptoms of great debility make their appearance; or until the morbid heat be carried off, and the skin opened. Several eminent modern physicians[1], however, recommend it to be given early in the disease, and persevered in; but from my own experience I am inclined to consider the former the safer practice, and believe that the best effects will be produced from the cinchona, when its use, in pure typhus, is not begun until the system has been fairly brought under the influence of mercurials, till the skin becomes moist, the tongue is in part cleaned, and the urine deposits a critical sediment. The best adjuncts in these cases are the diluted sulphuric, or the hydrochloric acids and aromatics, particularly the tincture of capsicum.

Cinchona has been employed in some inflammatory affections. It was first conjectured to be useful in *gout* by Sydenham, and in some cases its efficacy is sufficiently evident. In acute *rheumatism* it was employed by Morton, Fothergill, and Saunders; and Dr. Haygarth[2], more lately strongly recommended it to be given after the manner of Morton, Hulse, and Fothergill, from the commencement of the disease; the stomach and bowels being previously emptied by means of antimonial preparations. In my own practice, I have found it useful only after the liberal exhibition of calomel, tartarized antimony, colchicum, and opium, when the pain has partly abated, or assumed an intermittent character, and the pulse has become softer.[3]

In *phthisis*, Cinchona bark is found beneficial when the accompanying hectic puts on more of the intermittent form than usual; when the debility is considerable, and blood is mixed with the sputa; and in several cases of pneumonia, when, after repeated large bleedings and evacuations, the pulse continued hard and thrilling, and the blood buffy, although the expectoration was free and the skin open, I have seen this bark produce the happiest effects.

In various *cutaneous diseases*, as Lichen *agrius* and *lividus;* in Purpura[4]; in Impetigo *erysipèlatodes* and *scabida;* in Pompholyx

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[1] *Clarke* of Newcastle, *Heberden*, &c.

[2] *A Clinical History of Diseases, &c. by J. Haygarth, M. D.* 1835.

[3] M. Briquet has published some cases of the almost specific influence of disulphate of Quina in acute rheumatism (see Part III.).

[4] *Willan.*

diutinus, and in some varieties of Erysipelas, and in extensive ulcerations both from common inflammation and venereal affections[1]; in the termination of all acute diseases after the urgent symptoms are subdued: in convalescence from either acute or chronic diseases; and in dyspepsia, chronic debility, and nervous affections, cinchona is found to possess great efficacy.

As a local remedy, Cinchona bark is sometimes used in the form of gargle in malignant sore-throat, and aphthous affections, and as a wash to fetid gangrenous sores: in these cases the red bark is to be preferred. Powerful effects, also, are said to have been produced on the body by friction with the extract, softened by saliva or oil, upon the thighs and other parts of the body. It may be efficaciously administered, as already stated, per anum, when it cannot be taken into the stomach; but Denman says he found no advantage from its use as a clyster in the low state of puerperal fever, in which it has been highly extolled.

Cinchona bark is administered in a variety of forms. (See *Preparations and Compositions.*) In substance it is reduced to the state of an impalpable *powder;* and although it loses some of its activity during the process of pulverization, yet, when it can be retained on the stomach, this is a good form of the remedy.[2] If it excite nausea or vomiting, or operate as a cathartic, or occasion costiveness, these inconveniences may in some degree be obviated by combining it with aromatics, opium, or a cathartic, as circumstances direct; or its salts, or some of the lighter preparations, in which its active principles are supposed to be extracted, free from the grosser parts, may be employed. The powder is given mixed in wine[3] or in water; or, when the taste is an objection, in milk

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[1] *Pearson.*

[2] Fabroni says, "Cinchona loses its solubility, and consequently its activity, by long exposure to the air, and by pulverisation long protracted with the view of rendering it as fine as possible. From $\frac{6}{100}$ to $\frac{12}{100}$ parts of soluble matter are obtained from bruised cinchona, which in fine powder yields only $\frac{6}{100}$ or $\frac{7}{100}$ to water." Practitioners ought never to purchase bark in the state of powder, for in this state it is always found more or less adulterated. Dr. Paris (*Pharmacologia*) mentions that, in the official inspection of the shops of apothecaries and druggists, "the censors have repeatedly met with powdered cinchona, having *a harsh metallic taste.*" This may arise from the admixture of a species of bark, lately introduced into Europe from Martinique, resembling the Exostema *floribundum* (Cinchona *floribunda* of Swartz), and which, by an analysis of M. Cadet (*Journ. de Pharm.* vol. ii. p. 54.), was found to contain iron. The bark of this Exostema is both emetic and purgative; and if this new bark possess the same properties, it is unnecessary to add, that it must prove injurious when combined with good cinchona. A less injurious, but equally fraudulent, admixture is the powder of bark, which has been employed in making the extract; and of very inferior bark, much of which, we have been informed, is imported for no other purpose. It contains neither cinchona nor quina.

[3] In the *Schedion*, an Italian handbill of directions for using the bark, published in 1649, "two drachms of the bark, finely powdered and infused in good white wine, three hours before the expected paroxysm," are ordered to be taken as soon as the slightest symptom of the attack appears.

or syrup, or a solution of extract of liquorice, all of which effectually cover the taste, provided the dose be taken directly after it is mixed.[1]

The dose of the powder is from grs. v. to ʒij. or more. In intermittents the full dose is sometimes given at first[2]; but in other diseases, grs. v. x. or xv. are sufficient to commence with, the dose being repeated every two, three, or four hours, and gradually increased, until one ounce or more, in some cases, be taken in twenty-four hours.

Cinchona bark, either in the form of powder, or in decoction, may be employed as an antidote in poisoning by tartar emetic.

The action of the alkaloids will be described under Quina Dusulphas and Quina Murias. Part 3.

Officinal preparations. — *Infusum Cinchonæ*, L. E. D. *Infusum Cinchonæ Spissatum*, L. *Infusum Cinchonæ pallidæ*, L. *Infusum Cinchonæ Pallidæ Spissatum*, L. *Decoctum Cinchonæ*, L. E. D. *Decoctum Cinchonæ pallidæ*, L. *Decoctum Cinchonæ rubræ*, L. *Extractum Cinchonæ*, L. E. *Extractum Cinchonæ pallidæ*, L. *Extractum Cinchonæ rubræ*, L. *Tinctura Cinchonæ*, L. E. D. *Tinctura Cinchonæ pallidæ*, L. *Tinctura Cinchonæ composita*, L. E. D.

CINNAMOMI CORTEX. See *Laurus Cinnamomum.*

CINNAMOMI OLEUM. *Ibid.*

CISSAMPELOS. *De Candolle, Syst. Nat.* i. p. 530.

Cl. 22. *Ord.* 10. Linn. Diœcia Monodelphia. *Nat. ord.* Menispermaceæ.

G. 1826. *Male.* *Calyx* four-leaved. *Corolla* none. *Nect.* rotate. *Stamens* five. *Filaments* connate.

Female. *Calyx* one-leafed, ligulate, subrotund. *Corolla* non. *Styles* five. *Berries* one-seeded.

Sp. 15. C. *Pareira.* *Willd. tome* 9. *p.* 861. *Woodville's Med. Bot.* 227. *t.* 82.

Officinal. PAREIRA, *Lond. Edin. Dub.* Pareira (*Brava*). Velvet-leaf, the root.

Syn. Pareira brava (*F. I.*), Abutua (*Port.*), Grieswurzel (*G.*).

This plant is a native of South America, Jamaica, Saint Domingo, and several other of the West India Islands.[3] It is a climb-

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[1] Mutis, conceiving that fermentation is the best method for extracting the active part of cinchona, has proposed to make a beer of it, by fermenting one part of the bark in powder with eight parts of honey or sugar, and 80 or 100 of water. And Alibert, having persuaded a brewer to make some beer with cinchona, administered it to convalescents, weakened by protracted intermittents, with the best effects.

[2] This was always the case, on the first introduction of the remedy into European practice. The patient was also ordered to abstain from all other medicine.

[3] There is another species of Pareira, namely C. *glaberrima*, or red Pareira of Brazil, the root of which is said by Auguste St. Hilaire to be the true Pareira of commerce.

ing plant, with smooth and closely pressed pubescent stems. The leaves are peltate, semi-orbiculate, or mucronate at the apex, smooth on the upper but pubescent on the under disk, with the petioles of various length, often longer than the limb. The flowers are small, yellow, in racemose corymbs, with divaricate pubescent branches, and furnished with sessile bracts, which are roundish, and scarcely mucronate at the apex. The fruit is a roundish, compressed, scarlet berry, with a rugose, attenuated margin, and covered with long hairs, and containing a solitary uncinate seed.

Qualities.—The root, which is the officinal part, is imported in pieces of various thickness, from that of the finger to the arm, and two feet or more in length, often twisted, and covered with a thin, firmly-adhering, smooth, brown cuticle; but sometimes studded with rugose excrescences. The interior is ligneous, of a yellow colour, and porous, consisting of concentric circles, traversed by medullary rays. It is inodorous, and has a sweetish, nauseous, bitter taste, yielding its properties both to water and alcohol. According to the analysis of M. Fenuelle[1] it contains a soft resin, a yellow colouring matter, a *brown principle, fecula, malate of lime, nitrate of potassa,* and a *peculiar azotized matter.* Wiggers[2] asserts that its active principle is an uncrystallisable alkaloid, which he has named *Cissampeline* or *Pelosine.* The infusion and decoction of the root displays the presence of starch, both by iodine and infusion of galls.

Medical properties and uses.—According to Piso, the juice of this species of Pareira was formerly employed in Brazil against the bites of serpents. It was also known to the Brazilians as a remedy in obstructions of the urinary organs. Pareira Brava is tonic, aperient, and diuretic. Helvetius first investigated its influence in nephritic and calculous cases; and he ascribed to it lithontriptic powers. Geoffrey, who also examined it as a medicine, says that it operates by dissolving the mucus, by which the sabulous matter adheres in calculous diseases; but it is probable that its influence is purely tonic and diuretic. Sir Benjamin Brodie extols its powers in chronic inflammation of the bladder; it allays, he thinks, the irritability of the organ, and lessens the formation of the ropy, alkaline mucus. It has also been administered in ulceration of the kidneys, leucorrhœa, dropsy, rheumatism, and jaundice. Sir B. Brodie adds to the decoction tincture of henbane; and where there is a deposit of the triple phosphates, indicated by milky urine, and an irridescent pellicle on its surface, he conjoins with it nitric acid. I have had frequent opportunities of witnessing its salutary influence in catarrhus vesicæ.

The dose of the powdered root is from ʒss. to ʒj.

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[1] *Journ. de Pharm.* vii 404.

[2] *Berl. Jahrb.* 1838.

Officinal preparation. — *Decoctum Pareiræ*, L. *Extractum Pareiræ*, L. E. *Infusum Pareiræ*, D.

CITRUS. *Spec. Plant. Willd.* iii. 1426.

Cl. 18. *Ord.* 3. Polyadelphia Icosandria. *Nat. ord.* Aurantiaceæ.
G. 1391. *Calyx* five-cleft. *Petals* five, oblong. *Anthers* twenty, the filaments united into different parcels. *Berry* nine-celled.
Species 1. C. *medica.* The Lemon-tree. *Med. Bot. 3d edit.* 528 *t.* 189. *Citrus Limonum. Risso, Ann. Mus.* xx. 204.
Species 4. C. *Aurantium.* The Sweet Orange-tree. *Med. Bot. 3d edit.* 523. *t.* 188. *Risso, Ann. Mus.* xx. 181. *t.* 1. *f.* 1.
Species C. *Bergamia. Risso,* the Bergamot orange.
Species C. *Bigaradia:* The Seville Orange-tree. *Risso, Orang.* p. 148.

1. CITRUS MEDICA.[1] Var. β. C. *Limonum.*

Officinal. LIMONUM CORTEX. LIMONUM OLEUM, *Lond. Edin. Dub.* LIMONUM SUCCUS, *Lond. Dub.* LIMONES, *Edin.* Lemons: their rind, essential oil, and juice.

Syn. Limon (*F.*), Zitrone baum Limone (*G.*), Limon (*I.*), Limon (*S.*), Limao (*Port.*), Lemoen (*Dutch*), Limon (*Swed.*), Limon (*Dan.*), Limon (*Russ.*), Lemōn (*Arab.*), Lému (*H.*), Jambéra (*Sans.*), Elimitchum pullum (*Tam.*), Jerook (*Malay*), Usi (*Celebes*).

The lemon-tree is a native of Assyria and Persia, whence it was brought into Europe; first to Greece, and afterwards to Italy.[2] It is now cultivated in Spain, Portugal, and France, and is not uncommon in our green-houses.[3] It is a beautiful evergreen, of small growth, seldom exceeding fifteen feet in height, sending off numerous branches covered with a greyish bark. The leaves are alternate, of a shining pale-green colour, ovate, oblong, acuminate, about four inches long, and two inches broad, serrulated at the edges, and supported on naked linear footstalks. The flowers, which appear the greater part of the summer, are purplish externally, white internally, odoriferous, large, and placed on simple and branched peduncles, arising from the smaller branches. The calyx is saucer-shaped, with the teeth pointed; the petals are oblong, concave; the filaments, united at their base into four parcels, support yellow vertically-placed anthers; the ovary is superior, roundish, supporting a simple style with a globular stigma. The fruit is an oblong berry, pointed at each end, rough, punctured, externally of a pale yellow colour, and internally divided into seven, nine, or eleven cells, containing four seeds in each, and filled with vesicles

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[1] Μηλεα μηδικη Theophrasti et Dioscoridis.

[2] Venit in Italiam post Virgilii et Plinii tempora, ante Palladii. — *Willd. S. P.* iii. 1426. The fertility of the lemon tree is proverbial in Italy. A wager was laid in 1812, by Signor Antonio Georgeri of Massa, with Marchese Calami of Spezia, that at Cresullo, half a mile from Massa, there was a lemon tree which would mature, that year, fourteen thousand lemons. It exceeded the quantity. — *Lander's Conversations,* vol. i. p. 122.

[3] It was first cultivated in Britain in the Oxford garden about the year 1643.

distended with a sharp acid juice. The exterior rind is thin, yellow, and chiefly made up of a great number of concave vesicular cysts, filled with a very fragrant oil. Lemons require ten months to ripen; and they arrive at maturity in succession.[1]

Lemons are brought to England from Spain and Portugal, and some from the West Indies, but the latter chiefly supplies the Lime, the C. *Limetta.* It is smaller than the lemon, of an oval shape, thinner in the rind, and, although as acid, yet milder than the lemon. Lemons are imported, packed in chests, and each lemon separately rolled in paper. The Spanish lemons are most esteemed; and those which have the thinnest skins are the best.

Qualities.—Lemon-*juice* is sharp, but it is a very grateful, somewhat aromatic acid. It consists principally of 1·97 *citric acid,* 2·5 *mucilage, extractive, malic acid,* and *saccharine matter,* and 85·73 per cent. of water. Before Scheele's process for preparing citric acid was known, many different unsuccessful plans were adopted for separating that acid from lemon-juice. It is now obtained in a crystallized form, and admitted into the British pharmacopœias.[2] The simple juice, although well depurated of its extractive matter, yet soon spoils; and therefore the crystallized acid dissolved in water is often used in its stead.

The *rind* is warm, aromatic, and slightly bitter, qualities depending on the volatile oil it contains, which is given out to water, wine, and alcohol. It becomes brown when dried, and loses much of its taste and odour. Besides the volatile oil, its interior bark contains a crystallizable matter, which has been named *Hesperidin,* and its exterior a bitter extractive.

The *oil* is obtained by distillation and expression of the rind. The finest is procured by grating the fresh fruit, and submitting the grated rind to pressure; and, after some time, decanting the clear oil from the feculent matter. The oil is extremely light, nearly colourless, and fragrant: it has the same taste as the rind, only in a greater degree. Its sp. gr. is 0·878. It is very volatile, yet does not readily rise with alcohol, or with proof spirit. It absorbs oxygen from the atmosphere. When pure its formula is $C_{10} H_8$. It forms with hydrochloric acid gas two compounds, one solid, an artificial camphor. Formula $C_{10} H_8$, H Cl. The greater part used in this country is imported. It is sometimes adulterated with fixed oil, and with proof spirit. The former is detected by a drop of the oil, when evaporated on clean paper, leaving a greasy stain; the latter by the admixture of the oil with water rendering it milky.

Medical properties and uses.—Lemon-*juice* is refrigerant and antiseptic. It is given diluted with water and sweetened, forming

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[1] *Gærtner de Fructibus,* vol. ii. p. 189.

[2] For an account of this acid, vide *Acidium Citricum* among the preparations.

the beverage called lemonade, to quench thirst, and abate heat, in febrile and inflammatory diseases. Given alone to the extent of a table-spoonful for a dose, it allays hysterical palpitations of the heart; and in combination with carbonate of potassa (f℥ss. of the juice to ℈j. of the salt), taken in a state of effervescence, it is used with great success to allay vomiting, and determine to the surface. If the bicarbonate of potassa be used, the proportion of the salt should be 25 grains. A still more useful and pleasant effervescing draught is made by putting a table-spoonful of lemon-juice, mixed with a small quantity of sugar, into a tumbler, and pouring over it half a pint of soda-water. On account of its antiscorbutic powers, lemon-juice is successfully used in sea scurvy; and for this purpose large quantities of it, in a concentrated state, are distributed in the navy. Lemon-juice is given, also, united with camphor, infusion of cinchona bark and wine, in febrile disease of a low type: and, mixed with ardent spirits and water with sugar, it forms *punch*, which is a useful cordial in low fevers. It is also a useful remedy for restoring the stomach after poisoning by a narcotic, when the poison has been fully removed from the system.

Lemon *peel* or rind is added to stomachic tinctures and infusions, and is particularly applicable in dyspepsia, arising from irregularities in diet, and the inordinate use of ardent spirits. An excellent beverage in early convalescence may be made by pouring a pint of boiling water over the outer rind of one lemon, a small piece of dried orange-peel, and a moderate lump of sugar. When candied, lemon-peel is an agreeable stomachic confection.

The *volatile oil* is chiefly used as a perfume, to cover the smell of sulphur in ointments compounded with it; but it may be used like other volatile oils as a carminative. As a topical stimulant, it has been prescribed in chronic ophthalmia, by merely squeezing it from the fresh rind into the eye. Mr. Foote, who adopted the practice from Dr. Worlitz[1], considers it superior to vinum opii for this purpose.[2]

Officinal preparations. — Of the juice, *Syrupus Limonum*, L. E. Of the rind, *Tinctura Limonum*, L. D.

2. CITRUS LIMETTA.

Officinal. BERGAMOTÆ OLEUM, E. Oil of Bergamot.

Syn. Huile de Bergamotte (*F.*), Bergamot hol (*G.*), Bergamot-olie (*Dan.*), Oleo di Bergamotta (*I.*).

The tree, Citrus *Bergamia*, from the fruit of which this oil is procured, is a native of Asia; but it is cultivated in the south of

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[1] *Lond. Med. and Phys. Journ.* vol. viii. p. 306. New series.
[2] *Trans. of Med. Bot. Soc.* 1822.

Europe, especially near Nice, It differs from the orange and lemon-trees by the *leaves*, which are ovate, obovate, and oblong, being supported on wingless petioles. The *flowers* are small and white; the *fruit* is ovate or roundish, pale yellow, with a boss at the point. The *cysts* in the rind are concave: the pulp is subacrid, flat, and slightly bitter.[1]

The oil of Bergamot is procured by grating the fresh fruit, as described under the head of LEMON; or it is sometimes obtained by distillation. One hundred bergamots of Nice yield ℥ ijss. of oil by expression.[2] It is of a pale greenish yellow colour, with a most agreeable fragrant odour, and a pungent taste. Its sp. gr. is 0·885. It becomes concrete at 32° Fahr. It is identical, in its composition, with the oil of lemons. Formula C_{10} H_8.

Uses.—It is not administered as a medicine; and has been introduced into the Edinburgh pharmacopœia merely as a perfume.

3. CITRUS AURANTIUM.[3] C. BIGARADIA.

Officinal. AURANTII CORTEX, *Lond. Edin.* AURANTII FLORIS AQUA, *Lond.* AURANTII AQUA, *Edin.* AURANTII OLEUM, *Edin. Dub.* CITRUS AURANTII FRUCTUS, *Dub.* The rind of the fruit of the Citrus Bigaradia or Seville orange, orange-flower water, volatile oil of orange, and the fruit of the common sweet orange.

Syn. (*Immature fruit,*) Fruit verts d'orange (*F.*), Unreife Pomeranzen (*G.*), Pomeransknopp (*Swed.*), Collnngie pullum (*Tam.*), Jeroc manis (*Malay*), Jeruklegi (*Jav.*), Panneh dodang (*Cing.*), Usi (*Celebes*).—(*Ripe fruit and its rind,*) Orange, Ecorce d'orange (*F.*), Pomeranze, Pomeranzenschuske (*G.*), Arancio (*I.*), Naranjo (*S.*), Laranja (*P.*), Oranjeappel (*Dutch*), Pomerans (*Swed.*), Pomerantze (*Dan.*), Pomerants (*Russ.*), Saku limba (*Arab.*), Narunj (*Pers.*), Kirhlie pullum (*Tam.*), Naranj (*Hind.*), Narenj (*H.*), Nágaranga (*San.*).

The orange-tree is a native of India and Persia, but it is now abundantly propagated in the south of Europe and the West India islands, and is also found in our green-houses. There are two varieties; one is the sweet orange, C. *aurantium*, the other is the Seville or bitter orange, Citrus *vulgaris*, or *Bigaradia.* In its general appearance the sweet orange-tree resembles the lemon-tree. The stem, however, is more arborescent: the leaves, which are not so large as those of the lemon, and more pointed, are entire, smooth, and furnished with wings or appendages on the footstalks. The flowers, which appear all the summer, are large, white, odorous, and arise from the smaller branches upon simple and branched pedicels. The fruit is globular, seldom pointed, and of a

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[1] *Lindley. Flora Medica.*

[2] *Raybaud,* quoted by Dr. Christison, *Dispensatory.*

[3] Aurantia forte à corticis colore, qui colore auri relucet, ut aurea mala vere nominari possunt: sive ab Arantia oppido dicta, veteribus ignota, insitione ad nos devenerunt.—*Bauhin. Pin.* p. 436.

deep reddish-yellow or golden-orange colour; internally divided into nine cells, filled with a vesicular pulp, and each containing from two to four seeds. The rind, like that of the lemon, is double: the exterior thin and glandular; the interior, thick, whitish, and fungous. The bitter orange-tree is spiny; and smaller than the sweet orange-tree; the leaves are elliptical, acute, with a winged petiole. The flowers resemble those of the sweet orange-tree; but the fruit is rougher, of a deeper colour, and the juice less sweet, and more bitter, than that of the sweet orange. Both sweet and Seville or bitter oranges are imported from Spain, in chests, and packed in the same manner as lemons.

Qualities — The fresh *flowers* of the orange impart to water distilled with them their peculiar fragrance. The water is officinal in one of the British pharmacopœias. The *juice* of the Seville orange, Citrus *vulgaris*, is a grateful acid liquor, with a slight degree of bitterness. It consists of nearly the same principles as the juice of the lemon; with a smaller portion, however, of citric acid. The juice of the sweet orange is less acid, sweeter, and free from bitter. The *exterior rind* has a very grateful aromatic odour, and a warm bitter taste, depending on the volatile oil contained in its vesicles. Both the bitter and aromatic parts are extracted by water and alcohol, and the essential oil can be obtained by distillation. The oil has a similar composition to that from the lemon. Formula $C_{10}\ H_8$. The *unripe fruit* of Citrus *vulgaris*, named in common language Curaçoa orange, has the aromatic flavour of the rind with a greater degree of bitterness, both of which it retains when dried. The Curaçoa oranges vary in size from that of a pea to that of an acorn. The *distilled water* has the grateful perfume of the flowers. It may be procured from the flowers of both species; but that from the bitter orange flowers is preferred. The odour is more fragrant than that of the flowers. The best *orange-flower-water* is imported from Italy[1]; it should not blacken solution of sulphuretted hydrogen.

Medical properties and uses. — The *juice* of the Seville orange is employed in the same diseases, and with the same intentions, as lemon-juice, but it is not so generally used. The sweet orange is used in the same cases, namely, as an agreeable and salutary article of food and beverage in fever. The *rind* is a useful stomachic, carminative, and tonic, and is a common addition to bitter infusions in dyspepsia. In gout it is joined with magnesia and alkalies; and when the cinchona bark does not sit easily upon the stomach, it is a most useful adjunct to that remedy in whatever form administered. It has also been given alone in intermittents with seeming advantage.[2] The *oil* is only used as a perfume; but it may be added to bitter infusions as an oleo-saccharum.

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[1] My friend, Mr. Squire, has detected a salt of lead in it.

[2] *Murray's App. Med.* vol. iii. p. 289.

The dried *unripe fruit* (*Aurantium curassaventium*) is employed as an internal remedy in the same cases as the rind of the ripe orange. It is, however, more commonly used as a mechanical irritant in issues; for which purpose the smaller fruit is selected, and generally made round and smooth in the turning lathe. It is preferred for this purpose on account of its odour only, for the heat and moisture of the part in which the orange is lodged swells it as much as the common pea; and, therefore, it requires to be renewed once in twenty-four hours.

The usual dose of the dried rind, and of the Curaçoa orange is from grains x. to ʒ j., which are given three or four times a day.

Officinal preparations.—Of the rind, *Infusum Aurantii comp.* L. D. *Infusum Aurantii*, E. *Tinctura Aurantii*, L. E. D. *Syrupus Aurantii*, L. E. D. *Confectio Aurantii*, L. E.

COCCULUS. *De Candolle, Syst. Nat.* i. 515.

Cl. 22. *Ord.* 10. Diœcia Dodecandria. *Nat. ord.* Menispermaceæ.
G. 1826. *Male.* *Calyx* two-leaved. *Petals* four or six exterior, eight interior. *Stamens* sixteen.
Female. *Corolla* similar to that of the male. *Stamens* eight, sterile. *Germens* two or three. *Berries* one-seeded.
Sp. 4. C. *palmatus.* Palmated Menispermum. De Cand. *tom.* 1. *p.* 522. Berry, *Asiatic Res.* 10. *p.* 385. *t.* 5. *Woodville's Med. Bot. vol.* v. *p.* 22. *Willd.* iv. *p.* 825. *Hayne*, ix. 48.
Officinal. CALUMBA, *Lond. Edin. Dub.* Calumba, the root.

Syn. Colombe (*F.*), Kolumbowurzel (*G.*), Colombo wortel (*Dutch*), Calumbo rot (*Swed.*), Columbo (*Dan.*), Koren Kolomboe (*Russ.*), Colomba (*I.*), Raiz de Calumba (*Port.*), Kalumb (*Mozambique*), Columboo vayr (*Tam.*).

This species of Cocculus is a native of the eastern part of Southern Africa, growing in great abundance in the forests of Mozambique, between Oibo and Mozambique. The roots are dug up by the natives in the month of March, and transported to Tranquebar, where it is a staple article of export with the Portuguese.[1] In 1770, Poivre and Commerson, cleared the path for the subsequent investigations of Lamarc and Dr. Berry, by whom it was fully determined that the locality of the plant is Mozambique. An entire root was taken to Madras by Mons. Fortin, in 1805, and a plant raised from it there by Dr. Anderson, from a drawing of which it was ascertained to belong to the natural order Menispermaceæ; but, as it was a male plant only, the genus and species were undetermined. In 1825, both male and female plants were obtained by Captain Fitzwilliam Owen, from Oibo; and carried to the Mauritius, Bombay, and the Seychilles Archipelago. Dr. Berry drew

[1] The root was formerly erroneously supposed to be named from the principal town in the island of Ceylon, which was regarded as its place of export: the Mozambique name is *Kalumb.*

up the following character of the male plant, which has been adopted by De Candolle; but the female plant was undescribed until 1830, when Sir J. Hooker described both the male and female plants. The root is perennial, composed of fusiform tubers, from an inch and a half to three inches in diameter, covered with a thin brownish epidermis, internally formed of a ring of yellow bark, and a fleshy centre. The stems are annual, herbaceous, withering at the end of seven months; voluble, simple, round, hairy, about the thickness of a small finger, bearing distant, alternate, five-lobed, five-nerved, bright-green leaves, with entire acuminate lobes, and two usually proceeding from the same root; and supported on round hairy petioles, shorter than the leaves. The male flowers are in axillary, solitary, compound *racemes*, hairy, and shorter than the leaves, generally two together and drooping: bearing partial, alternate peduncles, with sessile flowers; and lanceolate, ciliated, deciduous bracts. The calyx is hexaphyllous, the sepals glabrous, equal, oblong, and obtuse. The corolla consists of six minute, oblong, wedge-shaped, concave, fleshy, obtuse petals. The stamens are six, a little longer than the corolla; the anthers four-lobed and four-celled: there is no pistillum. In the female plant, the racemes are solitary, axillary, patent, and shorter than those of the male. The calyx and petals resemble those of the male. The pistils are three, free, of which two are abortive: they are ovate, acuminate, glandulosopilose, and contain one ovule. The style is short; the stigmas patent; the fruit drupaceous, about the size of a hazel nut, hairy, each hair glandular; the seed subreniform, black, and striated. The plant is not cultivated, but the wild plants are dug up in March, and the offsets of the roots (the only parts taken), sliced, and dried in the shade.

The dried root is brought to this country packed in cases and chests. It is in transverse slices, generally about one third of an inch in thickness, and one and a half or two inches in diameter. The bark is thick, and easily detached, internally bright yellow, and covered with a wrinkled olive-brown cuticle. The interior part of the root is of a pale greyish yellow colour, of a spongy texture, with darker converging rays, which are the remains of sap-vessels. The pieces are much shrunk in the centre, frequently perforated, evidently by worms, and not, as has been supposed, by stringing to facilitate its drying. Those pieces which have the fewest worm-holes, the brightest colour, and are solid and heavy, are the best. It is said that the root of white bryony, tinged yellow with the tincture of calumba, has been fraudulently substituted for this root.

Qualities.—Calumba root has a very slight aromatic odour, and a bitter taste. It breaks with a starchy fracture, and is easily pulverised. Water at 212° takes up one third of its weight; and the

infusion has all the sensible qualities of the root. These are also extracted by alcohol, but proof spirit is its best menstruum. The infusion is not altered by solutions of sulphate of iron, nitrate of silver, bichloride of mercury, and potassio-tartrate of antimony; but a copious precipitate is produced by the infusion of galls and yellow cinchona bark, by diacetate and acetate of lead, bichloride of mercury, and lime-water. Hence calumba root was erroneously supposed to contain cinchonia. M. Planche found it to contain 16 per cent. of a *peculiar animal substance*, 13 of a *yellow, bitter, resinous matter*; a trace of *volatile oil*; 2 per cent of *gum*; 33 of *starch*[1], and 39 of *lignin*=100·00.[2] By repeated distillation, he also obtained a volatile oil; and, from the residue, malate of lime and sulphate of lime. By treating calumba root with alcohol of 0·835, then reducing the tincture by distillation to one third, allowing the residue to stand until crystals form in it and afterwards purifying these, M. Wittstock of Berlin procured a new salt, to which he gave the name of *columbin*, and which he supposes to be the active principle of calumba root. It is extracted by alcohol or ether: it is inodorous, extremely bitter, neither acid nor alkaline, in quadrilateral, transparent acicular crystals, or white prisms: is neutral, fusible, and contains no nitrogen. It is scarcely soluble in water or in cold alcohol: acetic acid is its proper menstruum[3]: but it is also taken up by alkaline solutions. According to Dr. Bödeker, its formula is $C_{42}\ H_{22}\ O_{14}$. Besides Columbine, calumba root contains Berberine, $C_{42}\ H_{18}\ N\ O_9$, which occurs in bright yellow crystals (needles), much more soluble in hot water and alcohol than columbine; this principle gives the chief activity to the calumba root; it exists in it to a much greater extent than the columbine.

An acid called columbic acid has also been found in the root, $C_{42}\ H_{21}\ O_{16}$; not crystalline, but obtained as a yellow resinous mass, bitter, sparingly soluble in cold ether, not very soluble in water, but much more so in acetic acid; it possesses a strong acid reaction.

Medical properties and uses.—Calumba root is a useful antiseptic and tonic, devoid of any excitant property.[4] It was first brought into notice by Fr. Rede, in 1685. It is frequently employed with much advantage in diarrhœas arising from a redundant secretion of bile, and in bilious remittent fever, and cholera, in which it generally checks the vomiting. It also allays the nausea and vomiting which accompany pregnancy; and, according to Dr. Percival, it is equally serviceable in stopping the severe diarrhœa and vomiting

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[1] Iodine produces a blue in the infusion of calumba, made with boiling water, which distinguishes the true from the false calumba, sometimes found in the market.

[2] *Pharm. Centr. Blatt.* for 1831, p. 429.

[3] *Journ. de Pharm.* Fevrier, 1831, p. 77.

[4] The Africans of Mozambique esteem it as a remedy for venereal affections, and the Chinese employ it as an aphrodisiac.

which sometimes attend dentition.[1] Denman found it more useful than the cinchona in the low stage of puerperal fever.[2] As a tonic, unaccompanied with astringency, and possessing little stimulus, it has been recommended in phthisis and hectic fever, to allay irritability, and strengthen the digestive organs; and in dyspepsia. It may be given combined with aromatics, orange-peel, opiates, and alkaline, or neutral salts, as circumstances require. I have found the powder, in combination with rhubarb and sulphate of potassa, exceedingly serviceable in mesenteric fever. In Germany its value in dysentery obtained for it the name of *Dysentery root.*[3]

The dose of the powdered root[4] is from grs. x. to ʒss., repeated three or four times a day.

Officinal preparations.—*Infusum Calumbæ,* L. E. D. *Tinctura Calumbæ,* L. E. D.

COCCULUS INDICUS.

Menispermum Cocculus. *Linn.* Cocculus Suberosus. *De Candolle.* Now placed by Wight and Arnott in the genus Anamirta.

The plant belongs to the Linnæan class and Order Monœcia Dodecandria or Hexandria Trigynia. Willd. Natural order Menispermaceæ.

Officinal. COCCULUS, *Edin.* Fruit of Anamirta Cocculus (Wight and Arnott, Flora Penins. Ind. Orient.), *Cocculus Indicus.*

Syn. Coque de Levant (*F.*), Kokkelskörner, Fishkörner (*G.*), Kokkelsorn (*Swed.*) Galla de Levante (*I.*).

The botanical characters of the genus Anamirta are as follows. Flowers diœcious, *calyx* of six sepals in a double series, with twoclosely-pressed bractioles, *corolla* none. MALE. Stamens united into a central column, dilated at the apex; *anthers* numerous, covering the whole globose apex of the column. FEMALE. Flowers unknown. *Drupes,* one to three, one-celled, one-seeded. *Seed,* globose, deeply excavated at the hilum. *Albamen,* fleshy. *Cotyledons,* very thin, diverging (*Wight and Arnott*).

Anamirta Cocculus is a strong climbing shrub, with the bark corky, ash coloured, and deeply cracked into fissures. Leaves roundish, acute, very slightly cordate, if it all; sometimes truncated at the base, hard, leatherly, shining, smooth (said to be downy when young), with five digitate ribs, about six inches long, and as many broad; stalks a little shorter than the leaves, tumid at both ends, especially the lower. Female flowers in lateral compound racemes.

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[1] *Medical and Experimental Essays,* vol. ii.

[2] *Introduction to Midwifery,* vol. ii. p. 524.

[3] Ruhrwurzel.

[4] A wood has lately been imported under the name of Calumba wood; and I am informed it is ground into powder for adulterating Calumba powder. It is, assuredly, not the stem of C. *palmatus.*

Drupes 2-3, globose. Cotyledons distant, linear oblong, very membranous. It is a native of the Malabar coast, and the Eastern islands of India; the fruit, which alone is officinal, was formerly called Cocculus Levanticus, from its being imported from the Levant, and for a very long period its poisonous properties have been known, for it was used as a medicine by the Arabian physicians.

The (dried) fruit (the officinal part) occurs in the form of light roundish, blackish-brown berries, not unlike bay-berries, but usually smaller, much wrinkled on the surface; within is a ligneous bivalvular shell enclosing an oily kernel, of a whitish colour, and somewhat kidney shaped. This kernel never fills the shell, which readily distinguishes the fruit from bay-berries. The Edinburgh College orders "that the kernels should fill at least two thirds of the fruit:" sometimes the kernel is shrivelled to a mere membrane.

Qualities. — The fruit has no odour, but a very bitter taste, the bitter principle residing chiefly in the kernel. At least two crystalliazble principles are contained in the berries; one named *Picrotoxine*, the second *Menispermine;* besides these, there exists about 50 per cent. of a fixed concrete oil, together with wax, resin, gum, starch, lignin, &c.

Picrotoxine. — Discovered by M. Boulay, exists in the kernels of the fruit, and, when pure, occurs in acicular needles, rhombic prisms, or grains or tabular crystals. Soluble in about 150 parts of cold, and twenty-five parts of boiling water; in about three parts of alcohol and two of ether. Its solutions are neutral to test papers, and it does not combine with acids, and very slightly with alkalies, although it was at one time supposed to be an acid, and then called Picrotoxic acid. Composition $C_{12}\ H_7\ O_5$ (?). It was once supposed to contain nitrogen.

The following is the mode of obtaining this principle, employed by Pelletier and Couerbe, but somewhat modified and improved by Dr. Christison (Dispensatory.) "The kernels, thoroughly freed of shells, are to be beaten to a pulp in a mortar heated to 212° Fahr.; the concrete oil is then expressed between heated plates; the residuum, reduced to powder, is exhausted by percolation with rectified spirit, and the spirit distilled off, as far as possible, in the vapour bath. The residue, which is intensely bitter, is then agitated with boiling water faintly acidulated with muriatic acid; upon which some concrete oil separates and floats on the top, while the Picrotoxine is dissolved, and may be obtained on cooling the water, after moderate concentration. By dissolving the dark crystals thus formed in boiling acidulated water, and treating the solution with animal charcoal, pure crystals will be formed on cooling."

Menispermine. — An alkaloid chiefly contained in the shells, discovered by Pelletier and Couerbe, when pure occurs in white

prisms, insoluble in water, but soluble in alcohol and ether; the solutions are alkaline. Composition $C_{18}\ H_{12}\ N\ O_2$ (?).

Paramenispermine. — Said to be isomeric with menispermine—but little is known about it.

Medical properties and uses. — Externally cocculus indicus has been employed in obstinate cutaneous affections of the scalp, &c. and also to destroy pediculi: it is used for these purposes in the form of an ointment (Unguentum cocculi). Internally these berries act upon the system as narcotico-acrid poisons, producing nausea, vomiting, abdominal pains, and then a kind of intoxication and giddiness. They are forbidden by law to be used in England: yet there is much reason to believe that they are frequently employed in the manufacture and adulteration of malt liquors. Dr. Taylor has collected two cases of poisoning with the berries; one in the case of a man, the other of a boy.

They act similarly on the lower animals, and a composition containing them is employed for stupifying and taking fish.

Dr. Glover has recently experimented with picrotoxine on several animals, and from his results he draws the following conclusions:—

1. Picrotoxine causes peculiar movements very similar to those described by Flourens, as resulting from sections of the cerebellum, and perhaps of the corpora quadrigemina. He did not think, however, that the animals in his experiments were blind until just before death, if then, as in the cases where Flourens cut away the corpora quadrigemina. The iris was certainly in some cases contractile, until the symptoms became very severe, when the pupil was enormously dilated. 2. Picrotoxine acts powerfully on the spinal cord, and generally as a narcotico-acrid poison. 3. It is not one of those very energetic principles, like conia, aconitina, &c., although a most terrible poison. 4. The animal temperature was much increased in some of these experiments. The peculiar movements caused by picrotoxine, Dr. Glover thought neither reflex nor voluntary, but should be considered a third kind of motion.

Dr. Glover gave to an ass 100 grains, to dogs from 20 to 40 grains; to the rabbit 10 grains, to the frog 5 grains, to the pigeon 4 grains.

Officinal preparation.— *Unguentum Cocculi*, E.

COCCUS.[1] *Syst. Nat. Gmelin*, 2220.

Cl. 5. *Ord.* 2. Insecta Hemiptera.[2]

G. 229. *Rostrum* or *Snout* seated on the breast. *Antennæ* filiform.

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[1] Κοκκος βαφικη, Dioscoridis, is the Kermes or Coccus *Ilicis*, Linn. which was known, as a dye, by the Phœnicians before the time of Moses; and was the *tola* of the Jews. —*Beckman's History of Inventions*, translation, vol. ii. p. 185.

[2] Cl. vii.—*Rhyngota*, Spec. 21. *Fabricii.*

Abdomen bristled behind. *Wings* two, erect in the males; females apterous.

Species 22. *C. Cacti.* Cochineal Insect. *Reaum. Ins.* iv. *t.* 7. *fig.* 11, 12. *Phil. Trans.* lii. 661. *pl.* 21. *Brandt & Ratziburg Medizinische Zoologie,* ii. 217.

Officinal. Coccus Cacti, *Lond. Edin. Dub.* Cochineal.

Syn. Cochenille (*F.*), Cochenille, Koschenille, Scharlachwurm (*G.*), Cochenilje (*Dutch*), Koskenillen (*Swed.*), Cuzzinel (*Dan.*), Cocciniglia (*I.*), Cochinilla (*S.*), Cochenilha (*Port.*), Cochineel poochie (*Tam.*).

This coccus is found in its wild state in Mexico, Georgia, South Carolina, and some of the West India Islands, feeding on several species of cactus, particularly the common Indian fig, or prickly pear plant (*Opuntia vulgaris*)[1]: but in Mexico, particularly in the provinces of Oaxaca and Guaxaca, and some of the adjoining Spanish settlements[2], where the insect is, as it were, domesticated and reared with great care, it feeds only on a species of cactus which was supposed to be the Cochineal Indian fig, Nopal (*Opuntia cochenillifera*); but which, Humboldt says, is a distinct species, the fruit being internally white. It is cultivated for this purpose; and on it the insect attains to a greater size than in the wild state. It is a small insect, very seldom exceeding a barley grain in magnitude; with the head, except in the males, scarcely distinct from the body, which is depressed, downy, and transversely rugose. The abdomen is of a purplish red colour, flat below and convex above; and the legs are six in number, short and black. The *males,* which are few in proportion to the females, there being only one to 100 or 200 females, are winged, slender, and active, with the body of a red colour: the head is small, but very distinct from the neck, furnished with short-jointed feelers, aud two long diverging white hairs, about five times the length of the body, which proceed from the tail; the body is elliptical, and furnished with white wings, which cross and lie flat when the insect rests or walks, but are erected when it flies. The *females* are nearly twice as large as the males: they have no wings and are sluggish, and after impregnation scarcely ever move from the part of the plant where they fix themselves. The back is hemispherical and crossed by numerous wrinkles: the body is of a much deeper red than that of the males: on the breast is an awl-shaped papilla, through which a fine thread is spun to form a web, with which the insect envelopes itself as soon as it is fully impregnated; when it becomes torpid, and immediately after laying its eggs dies, and is a mere useless husk. Each female lays several thousand eggs. The female forms the cochineal.

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[1] These plants have neither stem nor leaves, in the common acceptation of these words, but consist of roundish or oval compressed joints, that grow out of each other.

[2] "Kascala, Chulula, Nueva Gallicia, Chiapa, in New Spain; and Hambatio, Loja, and Tucuman, produce the greatest quantity." — *Ulloa* quoted by *Bancroft.*

The wild cochineal is collected six times in the year, just before the females begin to lay their eggs; a few being left on the plants to furnish a future supply. But the domesticated insect is collected thrice only in the same space of time, the domestication diminishing the number of broods to three in the year, owing to their propagation being suspended during the rainy seasons, whilst the downy covering of the wild species allows them to withstand the inclemency of these seasons. At the third gathering, branches of the plant, to which a certain number of females is left adhering, are broken off, and preserved with great care under cover during the rainy season; and after this is over they are distributed over the out-door plantations of the cactus, where they soon multiply, and in the space of two months the first crop is fit to be gathered. The chief plantations are in the district of La Mistica, in the province of Oaxaca, in Mexico. The placing the impregnated females on the plants is called sowing. Young ones are soon hatched, and when these are impregnated the harvest commences. The insects are detached from the plant either by means of a blunt knife, or brushed off with a squirrel's tail; they are then put into bags and dipped into boiling water to kill them; after which they are dried in the sun: and although they lose two thirds of their weight in this process, yet about 600,000 lbs.[1] are brought annually to Europe.

Cochineal was used by the natives of Mexico, when the Spaniards arrived there in 1518; and was introduced into Europe about the year 1523. The domesticated kind, which is not only much larger, but yields a richer colour, and is consequently most esteemed, is known in the language of the Spanish merchants by the name *grana fina:* the wild is one half the size only of the other, covered with white down or powder, and is denominated *grana silvestra;* but, as we receive them, both the kinds are often mixed together. Two distinct sorts, however, under the names silver cochineal, *Cochinella jaspeada,* and black cochineal, *Cochinilla renigrida,* are known in commerce: the former is most esteemed. There is an inferior kind called *granilla,* consisting of unimpregnated insects and fragments. Cochineal is imported in bags, each containing about two hundred weight. It has the appearance of small, dry, shrivelled, rugose berries or seeds, of a deep brown purple or mulberry colour, with a white matter between the wrinkles. In this state they suffer no change from length of keeping. Dr. Bancroft directs that that cochineal should be chosen as the best, which "is large, plump, dry, and of a silver-white colour on the surface."[2] The black cochineal is devoid of this silvery hue.

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[1] Each pound is said to contain 70,000 dried insects.
[2] *Philosophy of Permanent Colours,* 2d edit. vol. i. p. 434.

Qualities.—Cochineal has a faint, heavy odour, and a bitter, austere taste. It is easily pulverised, affording a powder of a purplish red hue, which has been found by Pelletier and Caventou to be composed chiefly of carmine, *cochenillin* (a peculiar animal matter), a *fatty matter, phosphate,* and *carbonate of lime,* and *chloride of potassium,* and *phosphate of potassa*[1]: the colouring matter is taken up by water, alcohol, and solutions of the pure alkalies. The watery infusion is of a violet crimson, the alcoholic of a deep crimson, and the alkaline of a deep purple, or rather violet hue. The colour of the watery infusion is brightened by all the acids: it is destroyed by chlorine. It is brightened also by bitartrate of potassa and alum; and, at the same time, is partly precipitated. It is also precipitated by sulphate of iron of a brownish violet colour, the liquid remaining a pale yellowish brown; and by sulphate of zinc and acetate of lead of a purple violet, the liquid being perfectly colourless: cochineal, therefore, is incompatible as a colouring matter with these metallic salts. The cochenillin, when pure, occurs as a crystalline substance of a purplish red colour, is soluble in water and alcohol, but not in ether; with the *hydrate of alumina* it forms the pigment called *lake.*

Medical properties and uses.—Cochineal is said to be diuretic, diaphoretic, and antispasmodic. It has been recommended as an antispasmodic and anodyne in hooping-cough. I have had no experience of its effects as an antispasmodic, and still less as an anodyne in neuralgia, for which it has been extolled by M. Sauter, who gave one hundred and twenty drops of a saturated tincture, morning and evening. It is well fitted for giving a fine colour to tinctures and similar preparations: and it is more useful in the arts than in medicine.

Officinal preparations.—*Syrupus Cocci,* L. *Tinctura Coccus Cacti,* D.

COCHLEARIA.[2] *Spec. Plant. Willd.* iii. 448.

Cl. 15. *Ord.* 1. Tetradynamia Siliculosa. *Nat. ord.* Cruciferæ.

G. 1228. *Silicle* emarginate, turgid, rugged; with gibbous obtuse valves.

Species 8. C. *Armoracia.*[3] Broad Horse-radish. *Med. Bot. 3d. edit.* 400. *Smith's Flora Brit.* ii. 690. *Hayne,* v. 29.

Officinal. C. ARMORACIA, *Lond. Edin.* Horse-radish root; recent root of Cochlearia Armoracia.

Syn. Cran, Raifort sauvage (*F.*), Meerretig (*G.*), Mierikswortel (*Swed.*), Meerradys (*Belg.*), Peperrod (*Dan.*), Pepparrot (*Swed.*), Chrzan (*Pol.*), Chren (*Russ.*), Rafana rusticano, Ramolaccio (*I.*), Marvisco (*S.*), Rubao rustico (*Port.*), Morungy vayr (*Tam.*).

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[1] *Journ. de Pharm.* 1818, p. 526.

[2] Named from a fancied resemblance of the leaf to an old-fashioned spoon.

[3] Ῥαφανὶς ἀγρία, Dioscoridis.

This plant is a perennial, growing wild in many parts of England, in moist situations, and in waste grounds, flowering in June; but it is generally cultivated for culinary and medicinal purposes. The root is long, tapering, and white, sending up many leaves, and a round, erect, branched stem, which rises about two feet in height. The *radical leaves* are petiolate, very large, lance-shaped, and waved, crenate, and sometimes pinnatifid. Those of the stem are sessile, much smaller, lanceolate, sometimes divided at the edges, at other times entire. The *flowers* are in terminal clusters, numerous, and of a white colour. The *leaves* of the calyx are ovate, concave, spreading, and deciduous; the *petals* white, obovate, twice the length of the calyx, and inserted by narrow claws. The ovary is heart-shaped, bearing a simple permanent style, crowned with an obtuse stigma, and changing into an elliptical bilocular pod, containing four seeds in each cell, which frequently prove abortive.

As the acrimony, on which its virtues depend, is lost in some degree by drying, it should be preserved in sand, in a cool place.

Qualities.—Horse-radish has a pungent odour, and a very hot, biting, acrid taste, with some degree of sweetness. When kept until it is quite dry, it loses more than two thirds of its weight, and in time the whole of its pungency is dissipated.

Both water and alcohol extract its active principles. The infusion reddens litmus paper, and precipitates solutions of the acetates of lead and of nitrate of silver. Coction destroys its acrimony, which depends on a volatile oil, that can be obtained separate when the mashed root is distilled with water. The oil is of a pale yellow colour, heavier than water, volatile at 60°, with an extremely pungent odour, and a sweetish, strong, acrid taste, exciting inflammation in the tongue and lips, to which it is applied. Einhoff, who examined this root, says the distilled watery liquid yields traces of sulphur.[1] Its constituents, according to Gutret, are the above-mentioned oil, *bitter resin, extractive, sugar, gum, starch, albumen, acidulous acetate, and sulphate of lime.*[2] From a recent examination of the oil of horse-radish, it has been found to have the same composition as that of the volatile oil of mustard, and to have sulphur as one of its elements. Formula, $C_8\ H_5\ N\ S_2$. (For other properties of the oil, see art. *Sinapis.*)

Medical properties and uses.—This root is stimulant, diaphoretic, and diuretic; and externally rubefacient. It is used, with advantage, in paralytic affections and chronic rheumatism, both internally and externally; and in dropsy, particularly when it follows intermittent fever, in which it was successfully employed by Sydenham. It has also been found efficacious in some cutaneous affections; and as a local remedy, a syrup made with a concentrated

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[1] *Ann. de Chim.* lxx. 185.

[2] *Gmelin, Handb. de Chim.* ii. 1248.

infusion of it, as recommended by Cullen[1], removes hoarseness arising from relaxation. Horse-radish may be given in substance, in doses of ʒss. or more, scraped, or in small pieces swallowed whole.

Officinal preparations.—*Infusum Armoraciæ compositum*, L. *Spiritus Armoraciæ compositus*, L.

COLCHICUM. *Spec. Plant. Willd.* ii. 272.

Cl. 6. *Ord.* 3. Hexandria Trigynia. *Nat. ord.* Melanthaceæ.
G. 707. *Spathe. Corolla* six-parted, with a rooted tube. *Capsules* three, connected, inflated.
Species 1. C. *autumnale.* Meadow-saffron. *Med. Bot. 3d. edit.* 759 *t.* 259. *Smith., Flor. Brit.* 400. *English Botany*, 133. *Hayne*, v. 45.
Officinal. COLCHICI CORMUS, COLCHICI SEMEN[2], *Lond. Edin. Dub.* The Cormus and the seeds of Meadow-saffron.

Syn. Colchique; Tue chien (*F.*), Zeitloze, Weissen Saffran (*G.*), Tydeloosen (*Dutch*), Hundedëd (*Dan.*), Tidlösa (*Swed.*), Colchico Autumnale (*I. S. Port.*), Rozsiad (*Pol.*), Bezvremennik (*Russ.*).

This is an indigenous perennial plant, generally found, in many parts of Europe, growing in moist rich meadow grounds[3], and flowering in September. The *Cormus* is solid, egg-shaped, and covered with a brown membranous coat. The leaves which appear in spring, along with the fruit, are radical and spear-shaped, about five inches long, and half an inch broad at the base. They are nevertheless preceded by the flower, which appears in autumn without any leaves.[4] It is, however, proper to state, that the cormus from which the flowers spring is the offset of that from which the leaves have decayed. There is no calyx. The *corolla*, which is of pale pinkish lilac colour, springs directly from the cormus, and consists of a tube about five inches long, two thirds of which are sunk in the ground; and a limb divided into six lanceolate, keeled segments. The *filaments* are half the length of the segments of the corolla, subulate, united to the upper part of the tube, and supporting yellow erect anthers. The *stigmas* are revolute. The *fruit* is a three-lobed, three-celled capsule, on a thick, short peduncle. The impregnated germen remains under ground, close to the cormus, till the following spring, when it rises in its capsular form above the surface, accompanied by the leaves. The seeds are ripe about the end of June.

Colchicum is propagated both by seed and by the formation of

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[1] The syrup is made by infusing one drachm of scraped horse-radish in one ounce of boiling water, in a covered vessel, and adding double its weight of sugar. Of this syrup a tea-spoonful is to be swallowed leisurely, and repeated at intervals.

[2] Κολχικον, Dioscoridis.

[3] It is very abundant in Essex and Suffolk.

[4] From this circumstance it is called "*naked lady*" in some parts of the country.

lateral cormi, which are nourished and grow at the expense of the parent cormus. The thick old cormus begins to decay after the flower is perfectly expanded; and the new cormi, of which there are usually two on each old cormus, are perfected in the following June, from which time until the middle of August the cormi may be taken up for medicinal use. The cormus, when mature, on being cut transversely, yields a milky-looking acrid juice, which produces a beautiful cerulean blue colour, if rubbed with the alcoholic solution of guaiacum. To preserve the virtues of the plant, the cormus, as soon as possible after it is dug up, should be cut into transverse slices, not thicker than one eighth of an inch, which should be dried, by placing them distinct from one another on clean, white, bibulous paper, without heat, or at a very low temperature. The test of the drug being good and properly dried, is the appearance of the blue colour, on rubbing it with a little distilled vinegar and the alcoholic solution of guaiacum. The slices also should not appear deeply notched or panduriform; as this is the mark of the cormus having begun to empty itself for the nourishment of the young bulbs; and, consequently, to suffer in its medicinal powers, from the chemical change which, at this period, its contents must necessarily undergo for the nourishment of the offsets. The slices should be preserved in well-stopped bottles.[1]

The *seeds* of colchicum should be collected in July and August. They are nearly round, in size about one twelfth of an inch, and of a reddish-brown colour. Their active properties reside in the testa; they do not spoil by being kept.

Qualities. — The recent cormus of this plant has scarcely any odour, but the little it has is *hircine.* When it is dug up at a proper season of the year, the taste is bitter, hot, and acrid, occasioning a warm sensation in the stomach, even when taken in a small quantity. At other seasons, however, and in some soils and situations, it possesses very little acrimony, and thence the contradictory opinions which authors have given of it. Its acrimony resides in a principle, which can be separated from the other components, and which was regarded as *veratria* by MM. Pelletier and Caventou[2], who discovered it in 1819, but Hesse and Geiger assert that it is a distinct alkaloid, which they have named *colchicia.*[3] It is procured in slender acicular crystals, which are inodorous, but have a bitter biting taste; it is less acrid than veratria, does not excite sneezing, and differs also from this alkaloid, in being soluble

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[1] Horses eat the flowers of colchicum with impunity; it acts as a poison to all other quadrupeds.

[2] *Journ. de Pharm.* ii. 217.

[3] To obtain *colchicia,* digest seeds of colchicum in boiling alcohol, and precipitate with magnesia. Dry the precipitate, and boil it with fresh alcohol: the colchicia is obtained by evaporation. — *Geiger, Journ. de Chim.* x. 465.

in water, and forming crystallizable salts with acids. Nitric acid colours it deep violet, which passes into indigo blue, then becomes green, and lastly yellow. It is a most powerful poison. One tenth of a grain has been known to kill a young cat, producing all the symptoms of an overdose of colchicum. The other components of the cormus are the following: a *fatty matter, gallic acid,* a *yellow colouring matter, gum, starch, inulin* in great abundance, and *lignin.* But it also contains *albumen* and *gluten,* as indicated by the blue colour which it strikes with guaiacum when it is touched with vinegar. Vinegar and wine are the best menstrua for extracting the active qualities of the cormus. A deposit forms in the wine, which Sir E. Home says is extremely acrid, exciting nausea and griping, and ought to be removed, as its removal does not alter the virtues of the medicine.[1] The seeds contain *colchicia,* and yield it up to wine, vinegar, and alcohol. They are less likely to vary in strength than the cormus.

Medical properties and uses.—Meadow-saffron possesses diuretic, purgative, and narcotic properties. It is the *hermodactylon* of the ancients. On the Continent, where it was recommended to notice by Baron Stoerck, it is a favourite remedy in dropsy, particularly hydrothorax, and in humoral asthma. But as it does not differ in its mode of action from squill, and is more uncertain in its operation, it has not been much used in that complaint in this country. In gout, rheumatism, and other diseases of excitement, however, its efficacy has been fully ascertained; and, in allaying the pain of gout, it may be almost said to possess a specific property. It operates on the bowels chiefly, stimulating the orifice of the common gall duct in the duodenum, so as to produce copious bilious evacuations; and acting on the nerves, it diminishes the action of the arterial system. With its purgative properties it exerts an anodyne influence and allays pain. It has been asserted that it promotes the excretion of uric acid[2], and by that means relieves gout; but this opinion requires confirmation. The petals of the flower, and the seed, possess the same medicinal properties as the bulb. In the seed the veratria exists in the testa or husk, and consequently the seeds should not be bruised in preparing the wine or tincture with them. When colchicum is overdosed it operates as a powerful poison; causing severe diarrhœa, and the most dangerous collapse.[3] Indeed its action on the bowels should never be permitted to proceed far, as it is the first indication of its

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[1] *Phil. Trans.* 1817, part II.

[2] *Chelius.*—*Dr. Weatherhead, Treat. on Headaches,* p. 88.

[3] The sensorium remains unaffected even in a dog, as Stoerck's experiments proved. In the animal experimented upon the stomach and the intestines displayed much inflammation, with gangrenous spots; and the intestine was so much contracted as scarcely to permit a probe to pass. The coats were tough, hard, and callous.—*Essays,* trans. p. 11.

poisonous influence. Mr. Laycock has employed the tincture of the bulb as a liniment, in gouty and rheumatic pains. It causes warmth and tingling in the part, and sometimes a crop of pimples.[1]

The dose in substance is from grs. iij. to grs. ix. of the dried cormus. Besides the officinal preparations, a wine may be made with ℥j. of the dried petals, and f℥xij. of white wine; and given in doses of ♏ xx. to ♏ lx. whenever the patient is in pain.

Officinal preparations.—*Acetum Colchici*, L. E. D. *Extractum Colchici*, L. *Extractum Colchici aceticum*, L. E. D. *Vinum Colchici*, L. E. *Tinctura Seminum Colchici*, D. *Tinctura Colchici*, L. E. *Tinctura Colchici composita*, L.

COLOCYNTHIDIS PULPA. See *Cucumis Colocynthidis*.

CONIUM.[2] *Spec. Plant. Willd.* i. 1395.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 533. *Partial involucre* halved, three-leaved. *Fruit* nearly globular, five-streaked, notched on each side.

Species 1. Conium *maculatum*. Common hemlock. *Med. Bot. 3d. edit.* 104. *t.* 42. *Smith, Flora Britan.* i. 302. *Hayne*, i. 31.

Officinal. CONIUM, *Lond. Edin. Dub.* The leaves of Hemlock, recent and dried.

Syn. Cigue ordinaire (*F.*), Geflecte Schierling (*G.*), Gevlakte Scheerling (*Dutch*), Skarntyde (*Dan.*), Spräckligodört (*Swed.*), Swinia wesz (*Pol.*), Boligolov piatnistoè (*Russ.*), Cicuta maggiore (*I.*), Conio manchado (*S.*), Ceguole (*Port.*).

Hemlock is a biennial, umbelliferous, indigenous plant, growing under hedges, by road-sides, and among rubbish, flowering in June and July. The root, which is fusiform, is whitish, and fleshy; when cut, it exudes a milky juice. The stem rises erect about four or five feet in height, is branching and leafy, round, hollow, striated, smooth, shining, and glaucous, maculated with brownish purple. The lower leaves are above a foot in length, on large sheathing petioles, supra-decompound, and shining; the upper ones are bipinnate; the whole stand upon channelled footstalks, proceeding from the joints of the stem, are incised, smooth, of a deep green colour on the upper surface, but paler underneath. The rays of the umbels are ten or twelve, those of the umbellules fifteen or sixteen. The involucral bracts consist of from three to seven short, turned-down, lancet-shaped, leaflets, with white membranous edges spread at the base; the involucel of three or four leaflets on one side only, and spreading. The flowers are very small; the petals white, the outer ones rather larger than the inner, cordates, inflected; the stamens the length of the petals, supporting white orbicular anthers; the styles two, filiform, diverging, and crowned

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[1] *Lond. Med. Gaz.* June, 1839.

[2] Κώνειον, Dioscoridis. Cicuta *vulgaris major*, *Park*, 932. Cicuta, *Dod.* 461.

with round stigmas. The fruit consists of oblong, ovate, striated, mericarps, with *crenulate* ridges, and no vittæ. They are convex on one side and concave on the other; *smooth,* and have a brownish-green colour when ripe. The two mericarps are sometimes united, and occasionally a portion of pedicel remains attached. On the concave side of the mericarp is a longitudinal furrow.

Hemlock is distinguished from other umbelliferous plants, with which it may be confounded, by its fruit, its *spotted* or maculated stem[1], the dark and *shining colour of its lower leaves,* and their *disagreeable* odour, when fresh and bruised, resembling in some degree that of the mouse, or the urine of a cat[2], and by the evolution of the alkaloid *conia* when treated with liquor potassæ.

For medical use, the leaves should be gathered about the end of June, when the plant is in flower; the small leaflets picked off, and the footstalks thrown away. The picked leaflets are then to be properly dried (vide *Powders,* Part III.); and as exposure to the air and light destroys the fine green colour of the plant, the loss of which is supposed to injure its active qualities, the dried leaflets must be preserved in boxes completely filled by gently pressing down the leaves, then covering the box with a closely-fitted lid, wrapping it in paper; and sealing the envelope. If the leaves be powdered, the powder may be preserved good in closely-stopped opaque phials, for many years.

Qualities. — The odour of properly dried *hemlock-leaves* is strong, heavy, and narcotic, but not so disagreeable as that of the fresh leaves: the taste is slightly bitter and nauseous. They are easily pulverized; and the powder should retain the beautiful green colour of the leaves. The acrimony only of the fresh leaves is lost in drying; but the narcotic principle remains uninjured if the operation be well performed. The fruit is small, ovate, striated with five ribs, and of a greyish-green colour. It has little or no odour, and a somewhat bitterish taste. The fruit may be kept a much longer time than the leaves without losing activity. The virtues of conium are extracted by alcohol and ether. To ether the leaves communicate a very deep green colour; and when the etherial tincture is evaporated on the surface of water, a rich dark-green resin remains, in which the narcotic principle of the plant appears to reside; it contains the odour and taste in perfection; and half a grain produces headach and slight vertigo. To this principle, which I discovered, Dr. Paris proposed to give the name of *Conein*[3]; but it is not Conia, and merely contains it as

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[1] The Chærophyllum *bulbosum,* bulbous-rooted cow parsley, has a spotted stem, but the joints are swelled, and the seeds *rough.*

[2] In Ray's Synopsis, *Conium maculatum* is named *Cicuta,*—a name still retained by the Dublin College; and owing to which the water hemlock, *Cicuta virosa,* has sometimes been confounded with it, and improperly used.

[3] *Pharmacologia,* p. 185.

one of its components. Brandes discovered a particular principle of an alkaline nature, which he terms *Cicutine*, of a green colour, insoluble in water, and in doses of half a grain causing vertigo and headach.[1] But it is to *Professor Geiger* of Heidelberg that the profession is indebted for the knowledge of the active principle of Conium. In 1827 Giseske[2] had observed that, in distilling hemlock and water with caustic lime, a strong odorous alkaline fluid was procured, which, when neutralized by sulphuric acid, formed a substance which was readily separated by alcohol, and was highly poisonous, its properties being the same as those of hemlock in a concentrated degree. Geiger in 1831, taking a hint from this result of Giseske's experiment, obtained the alkaloid. It is readily procured by distilling the alcoholic extract of the unripe fruit of hemlock with water and caustic potassa; an oily fluid passes over, which is to be neutralized with sulphuric acid, and concentrated to a thin extract: this is to be acted upon by a mixture of two parts of rectified spirits and one part of ether, and again formed into an extract, which must be distilled with a strong solution of potassa; a nearly colourless, transparent, oily-looking substance is procured floating on the water in the receiver. This being separated is found to possess properties of the most active kind: it is the *Conia* of Geiger.[3] M. Landerer procured an etherial oil from the leaves of conium.[4]

Conia is a volatile fluid of a pale straw-colour. It has a very powerful odour, and an extremely acrid, bitter taste: it is sparingly soluble in water, more so in alcohol and ether, has an alkaline reaction, and forms salts with the acids. Its vapour gives rise to white fumes with hydrochloric acid. Solutions of the Conia salts are precipitated by tannin. By exposure to air and light, Conia becomes of a dark brown colour, and a resinous matter is formed together with ammonia; by redistillation most of it can again be obtained of a pale colour. Its composition, as stated by Gerhardt, is $C_{16}\,H_{15}\,N$, and it has been recently proposed to represent it as ammonia, in which two of the atoms of hydrogen are replaced by butyryle:

$$\text{or, } N\left\{\begin{array}{l}(C_8\,H_7)\\(C_8\,H_7)\\\quad H\end{array}\right.$$

By the action of oxidizing agents, butyric acid is formed from Conia. From xl. ℔ of the unripe fruit, Dr. Christison procured ℥ ij.ss. of hydrated *Conia*. Dr. Christison made a series of interesting experiments on animals with this substance, which demonstrated that it operates with incredible energy on the nervous

[1] *Berlin Jahrbuch*, 1819, § 116.
[2] *Journ. de Pharm.* xiii. 366.
[3] *Mag. fur Pharm.* xxxv. 75.
[4] *Buch. Repert.* vol. iii. part I.

system, although its first influence is as a local irritant: it causes rapid paralysis, first of the voluntary muscles, then of the diaphragm and the respiratory muscles, and destroys by asphyxia. The heart remains unaffected. Few poisons equal Conia in subtilty and swiftness.[1]

Medical properties and uses.—Hemlock is a powerful narcotic, and is used as such both internally and as an external application. Stoerck, whose publications first brought it into general notice, rated its powers too high; and the multitude of discordant diseases which he enumerated as yielding to it, led many sober men to doubt its efficacy altogether. Hemlock is, nevertheless, a useful narcotic; and, if it have not succeeded in curing cancer in the hands of British practitioners, it is probably owing to the dose not having been carried to its full extent. It has been advantageously used as a palliative in both scirrhus and open cancer, abating the pain, and allaying the morbid irritability of the system. It has also been found serviceable in chronic rheumatism; scrofulous, syphilitic, and other ill-conditioned ulcers, and glandular tumours; in pertussis, and the protracted cough which often remains after pneumonic inflammation. In America it has been used in bronchocele with advantage.[2] An over-dose of it produces, sickness, vertigo, delirium, dilatation of the pupils, great anxiety, laborious respiration, coldness of the limbs, asphyxia.[3] Convulsions sometimes occur. The best antidote is infusion of galls, followed by vinegar, after the stomach has been evacuated, and the cerebral excitement reduced by bleeding and purging.

The powder of the dried leaves, if well preserved, and the extract, and tincture, are the best forms of this remedy. Hufeland recommends the fresh expressed juice in doses of ♏ xij. to ♏ lx. The expressed juice is preserved with difficulty by the addition of alcohol. It is occasionally used instead of the extract. The dose of the powder is grs. v. to grs. xxx.; that of the extract grs. v. to ℈j.: of the tincture, fl. ʒss. to ʒj.: but they may be gradually increased every day, until a slight vertigo forbids the further increase.

Officinal preparations.—*Extractum Conii*, L. E. D. *Pilulæ Conii comp.* L. *Tinctura Conii*, L. E. *Unguentum Conii*, L. *Cataplasma Conii*, L.

CONVOLVULUS. *Spec. Plant. Willd.* i. 844.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. Ord.* Convolvulaceæ.

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[1] *Trans. of Roy. Soc. Edin.* vol. xiii.

[2] *Journ. of Med. and Phys. Science, Philadelphia*, vol. i. p. 67.

[3] It is generally supposed that the poison administered to Socrates and Phocion was the expressed juice of conium, but the effects, as described in the Phædon of Plato, do not accord with this opinion.

G. 323. *Corolla* bell-shaped, plaited. *Stigmas* two. *Capsule* two-celled, each cell containing two seeds.

* *Stem twining.*

Sp. 4. C. *Scammonia.*[1] Scammony. *Med. Bot. 3d. edit.* 243. *t.* 86.

Officinal. SCAMMONIUM, *Lond. Edin. Dub.* Scammony, the gum resin.

Syn. Scammonée (*F.*), Scammonium von Aleppo (*G.*), Het Scammoneum (*Dutch*), Scamonea (*I.*), Escamonea (*S. Port.*), Skammonium (*Dan.*), Scammonia smola (*Russ.*), Sukmunya (*H. Arab.*), Mehmoodie (*Hind.*).

This plant is a native of Syria, Mysia, Cappadocia, and Cochin China. It grows in abundance on the mountains between Aleppo and Latachea, and there the greater part of the scammony of commerce is obtained.[2] The root, which is perennial, is tapering, from three to four feet in length, and from three to four inches in diameter, covered with a light grey bark, and contains a white juice. It sends up many slender twining stems, which extend from fifteen to twenty feet in length, adorned with arrow-shaped, smooth, bright-green leaves, angular at the base, upon long foot-stalks. The flowers are either in pairs, or in threes, consisting of a double calyx of four emarginated leaflets in each row, repand, and coloured at the apex, which is obtuse, with a reflexed point; and a funnel-shaped, pale sulphur-yellow, plaited corolla. The capsule is three or four-celled, containing small pyramidal seeds.

Scammony is obtained from the root of this plant[3]; and is collected in the beginning of June in the following manner. The ground is cleared away from the root, the top of which is then cut off in a sloping direction, about two inches below the place whence the stalks spring; and the milky juice which flows from it is collected in a shell fixed at the most depending part. Each root yields a few drachms only, which are drained off in about twelve hours. "This juice from the several roots is put together, often into the leg of an old boot, for want of some more proper vessel, where, in a little time, it grows hard and is the genuine scammony." — "The Jews," says Dr. Russel, "buy the scammony while it is soft, and mix it with the expressed juice of the stalks and leaves, with wheaten-flour, ashes, fine sand, or whatever else can answer their purpose." It is sent from Aleppo in what are called drums, which weigh from 75 to 125 lbs. each; but it is exported from Smyrna, packed in chests. There are three qualities of scammony known in the market, namely, *virgin scammony*, *seconds*, and *thirds*. The first, *virgin scammony*, is in amorphous masses, which are more

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1 Σκαμμωνια, Dioscoridis.

2 *Russel's Nat. Hist. of Aleppo*, vol. ii. p. 246. This scammony must not be confounded with what is called *Montpelier scammony*, which is the inspissated juice of Cynanchum *Monspeliacum*. There is also a *Smyrna Scammony*, which is referred to Periploca *Scammonium*.

3 No other part of the plant posseses any medicinal quality. — *Russel*, l. c.

or less covered with a whitish-grey powder, adhering to the mass: its sp. gr. is 1·210; it is light and friable. The *seconds* are in amorphous pieces, resembling the *virgin*, but heavier, the sp. gr. being 1·463[1]; and also in circular cakes, which present a grey fracture, are more compact and ponderous, less friable, and fuller of impurities than the virgin. The *thirds* are in cakes, circular and flat, scarcely exceeding one inch in diameter. They are heavier, denser, and less brittle than the cake seconds. The fracture, which is resinous, displays many air-cavities, and white specks which are chalk, the quantity of which adulteration is sometimes equal to 37·54 per cent.[2] Some other varieties have been described; but they are rarely or never found in English commerce.

Qualities. — Good Aleppo scammony is light, friable, and externally like a honeycomb. It has a peculiar, rather heavy odour, not unlike that of old ewe-milk cheese; and a bitterish, slightly acrid taste. The colour is bluish-grey or dull olive, changing to dirty white or greenish-yellow on lathering, when the surface of the mass is rubbed with the wet finger. The fracture is irregular, but smooth, faintly shining, and displaying small air-cavities; the sharp edges of the shivers are of a light grey colour, and translucent. It burns with a yellowish flame. Good scammony is pulverulent; and the powder has a light grey colour. Its specific gravity is 1·235.[3] When it is of a dark colour, heavy, and splintery, it should be rejected; and when its fractured surface effervesces with hydrochloric acid, it contains much chalk. The decoction, when cold, should not be rendered blue by tincture of iodine. When triturated with water, nearly one fourth of it is dissolved, and the solution appears slightly mucilaginous, opaque, and of a greenish-grey colour. This solution is not affected by alcohol, solutions of acetate and diacetate of lead, nor sulphate of iron, nor is it precipitated by the acids; but with sulphuric acid it gives out the odour of vinegar. Solution of ammonia does not alter it, but that of potassa occasions a yellowish precipitate, which is quickly redissolved on the addition of an acid. Ether takes up eight parts in ten of scammony, and when the solution is evaporated on water, it leaves a brownish semi-transparent resin. Alcohol dissolves two thirds of its weight; but proof spirit is its best menstruum, taking up the whole except the impurities. *Aleppo* scammony contains, according to Bouillon la Grange and Vogel[4], 60 parts of *resin*, 2 of *extractive*, 3 of *gum*, and 35 of *insoluble impurities*. The variety in flat cakes is heavier, harder, and less pulverulent than the Aleppo, and contains 29 of *resin*, 8 of *gum*, 5 of *extractive*, and 58 of *insoluble impurities*. According to Marquart, the components of Aleppo scammony are, 78·5 of *resin*; 1·5 *wax*; 3·5

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[1] *Pereira.* [2] *Pereira, Mat. Med.* [3] *Brisson.*
[4] *Ann. de Chim.* lxxii. 59.

extractive; 2 *extractive with salts;* 1·5 *starch;* 1·5 *bassorin* and *gluten;* 2·5 *albumen* and *lignin;* 2·5 of *ferruginous alumina, chalk,* and *carbonate of magnesia;* and 3·5 of *sand* = 100·00.[1] Scammony resin, according to Mr. Johnston, has the composition $C_{40} H_{33} O_{20}$. When the impurities consist of flour, sand, or ashes, they can be detected by dissolving the sample in proof spirit, as they sink and remain undissolved: but scammony is sometimes also adulterated with the expressed juice of cynanchum *monspeliacum;* and a fictitious scammony is also sold for the real, consisting of jalap, senna, manna, gamboge, and ivory black; and another described by Dr. Pereira, which seems to consist chiefly of guaiacum. It is in flat cakes of a dull slaty hue, breaks with difficulty, and has a sp. gr. 1·412.

Dr. Christison has analyzed both pure and adulterated scammony, and the following table shows the results which he obtained.

	Calcareous.			Amylaceous.		Calcareo-Amylaceous.
Resin - - -	64·6	56·6	43·3	37·0	62·0	42·4
Gum - - -	6·8	5·0	8·2	9·0	7·2	7·8
Chalk - -	17·6	25·0	31·6	—	—	18·6
Fecula - -	—	1·4	4·0	20·0	10·4	13·2
Lignin and sand -	5·2	7·1	7·8	22·2	13·4	9·4
Water - -	6·4	5·2	6·4	12·0	7·5	10·4
Total -	100·6	100·3	100·3	100·2	100·5	101·8

According to the London College, scammony should be porous, brittle, with a shiny surface. Should not emit bubbles when treated with hydrochloric acid; water digested upon it at 170° Fahr. should not strike blue with iodine, and seventy-eight parts in the 100 should be soluble in ether.

The Edinburgh tests are almost the same as the London, except that it is stated that 80 per cent. should be soluble in ether.

Medical properties and uses. — Scammony is a drastic cathartic, operating, in general, quickly and powerfully. The ancients were acquainted with its purgative qualities, and also employed it as an external application for removing hard tumours, itch, scurf, and fixed pains; but for the latter purposes it is now never used. It is a good purgative in the torpid state of the intestines, in leucophlegmatic, hypochondriacal, and maniacal subjects; in worm cases, and the slimy state of the bowels to which children are subject; and as a hydragogue cathartic in dropsy. Scammony has been regarded by some as a cathartic of so irritating a nature, as to require to be corrected by exposing it to the fumes of sulphur,

[1] *Pharm. centr. Blatt. fur* 1837–8, 687.

defæcating it with lemon-juice and other acids, and uniting it with demulcent mucilages; but except in an inflamed or very irritable condition of the bowels, it is a safe and efficacious purgative. It is, however, apt to gripe; on which account it is generally united with an aromatic, or a drop of some volatile oil.

The dose of scammony is from grs. v. to grs. xvj., whether it be given in powder or as a bolus, or in the form of mixture, triturated with almonds, gum, or extract of liquorice, and water.

Officinal preparations. — *Pulvis Scammonii comp.* L. E. D. *Confectio Scammonii,* L. D. *Extractum Scammonii,* E. *Mistura Scammonii, E.*

2. IPOMŒA JALAPA. EXOGONIUM PURGA.

I. *Purga.* *Winderoth in Litt. ad. Zuccar.* 1. *Scieoliana Zuccarini. Plant. Nov. Fasc. t.* 293. *t.* 12. *Lindley,* 396. *Hayne,* xii. 33, 34. *Coxe on Jalap Plant,* 1830.

Officinal. JALAPA, *Lond. Edin. Dub.* Jalap root or tuber. The root or tuber of Exogonium Purga (L. D.), Root of Ipomœa Purga (E.).

Syn. Jalap (*F.*), Jalappe (*G.*), Jalapparot (*Swed.*), Scialappa (*I.*), Julappa (*Port.*) Jalapa (*S.*), Julap (*Dan.*), Jalapni Keren; Jalapa; Bionok (*Russ.*).

The plant yielding Jalap is a native of America, taking its name from Xalappa, a city of Mexico, in the vicinity of which the traveller Schiede found it growing, and transmitted roots and specimens of it to Germany. This and the researches of Dr. Redman Coxe of Philadelphia, ascertained that it is not a Convolvulus but an Ipomœa: hence the name Ipomœa *Jalapa*[1]; but it is now considered to be an Exogonium, and called Exogonium Purga, or the true Jalap. It grows in a dry sandy soil, on the mountains around Chiconquiaco, on the eastern slope of the western Andes, at th height of 6,000 feet, within the line of frost in winter: it flowers in August and September. The tuber is perennial, of an irregular egg-shape, externally of a dark brown colour, internally white, and, when fresh, abounding with a milky juice. The tubers are numerous; and they are attached to the runners like buds. They send up many twining, round, twisted stems, of a light brown hue, which extend upwards of twenty feet, with smooth petiolated

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[1] It is said to have been cultivated in England by Mr. Miller in 1668; and that a few years ago two specimens were in vigorous growth in Kew Gardens, slips of the original plant introduced there by Mons. Thouin in 1778; but that these were the true jalap is doubtful.

A root of Ipomœa *Macrorhiza,* which was long supposed to be the true jalap, was carried by Michaux, junior, in 1803, from the Botanic Gardens of Charlestown to Paris, and planted there in the garden of the Museum of Natural History, where it now grows: it weighed forty-seven pounds and three quarters. — *Mémoires de l' Institut,* tom vi. 387. This plant, however, was proved, from three different sources in 1830, not to be the true jalap: and this opinion was confirmed by the roots sent by Ledanois, a French druggist at Orizaba in Mexico, to Paris in 1827.

leaves, of a bright green colour, varying in shape, the upper cordate, the lower angular, nearly hastate, oblong, and pointed. The under-surface of all the leaves is prominent and veined; and all are supported on foot-stalks the length of the leaf. The flowers are borne on axillary peduncles that send off two or three pedicels, each bearing a large, funnel-shaped, entire, plaited flower of a lilac purple colour, with a calyx composed of five oval, concave, obtuse, pale green sepals without bracts. The anthers are white, large, on long slender filaments; the style is longer than the filaments, the stigma capitate and simple, and the germen oval.[1]

The tuber of this plant, which is the jalap of the shops, was first brought to Europe about the year 1609 or 1610.[2] The best comes from Vera Cruz, usually transverse-sliced, and also in irregular-shaped entire tubers of various sizes, but the largest not greater than the size of the fist, covered with a very thin, wrinkled, brown cuticle. That which is sliced is more liable to be adulterated, which is said to be sometimes done with slices of briony root; but the fraud is easily discovered by the spongy texture and whiter colour of the latter, and its burning less readily when applied to the flame of a candle. It is more likely to be mixed with the sliced roots of Ipomœa *Orizabensis,* which are readily known, as the root is fusiform, and not a tuber. It occurs in grey slices two or three inches broad, cracked, lighter than true jalap, and internally paler. The resin is distinguished from that of true jalap by its solubility in ether, and forming a smooth emulsion with milk.

Qualities.—Good jalap is of an irregular globular shape. Small tubers are often attached to the large tubers, and curved: they are externally blackish-grey. Jalap has a sweetish, yet nauseous heavy odour when broken, and a sweetish, acrid, pungent taste. It is heavy, compact, and hard, with a shining brownish resinous fracture, which shows the internal part of a yellowish-grey colour, interspersed with deep brown concentric circles. It is pulverulent, affording a powder of a pale brownish-yellow colour. Both water and alcohol, separately, extract a part; and when mixed, take up the whole of the active constituents of jalap. Ether dissolves three parts of ten submitted to its action; and affords, when the solution is evaporated over water, a transparent insipid resin, and some extractive; but, according to Cadet, the ether takes up only a *soft* resin, and leaves a *hard* resin. Hence jalap appears to contain a *soft* and a *hard resin, sugar, starch, extractive,* and *ligneous* matter. According to Marquart, the jalap of commerce consists of 27·50 of *extractive* + 13·33 of *resin* + 59·16 *matters insoluble in alcohol* =

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[1] Observations on the jalap plant, by *John Redman Coxe, M.D.*, p. 9. I take this opportunity of publicly thanking Dr. Coxe for his polite attention in sending me a live tuber of the true jalap plant.

[2] *Baukin Prodromus,* p. 135.

100·00.[1] *Jalap resin,* or *jalapin,* when pure, is almost colourless; usually in the form of an amorphous powder, very tasteless, insoluble in water and ether, but very soluble in alcohol; from the solution in this menstruum it is precipitated by water. It is rendered crimson by oil of vitriol.

According to the analysis of Mr. Johnston, the formula for the resin is $C_{40}\ H_{34}\ O_{18}$. Some have stated that the resin consists of an acid, which has been called *Jalapic* acid, and a basic substance called *Jalapin,* but it is most probable that the resin is compound, consisting of two or more isomeric bodies. It is apt to be adulterated with other resins, as of guaiacum: the fraud can be detected by the action of chlorine or chloride of lime, which colours the guaiacum green. M. Henry gives the following as the result of his examination of several specimens of jalap found in France:—

		Extract.	Resin.	Residue.
Jalap leger,	—	75	60	270
sain,	—	140	48	210
piqué,	—	125	72	200

M. Guibourt has described a spurious jalap, which is often mixed with the true. It is ovoid, tapering at both extremities with a deeply furrowed surface, black in the bottom of the furrows, and whitish on their prominences. The interior is white, porous, and with concentric brown circles. The odour of the powder resembles that of the rose; the taste is sweet without acridity. M. Guibourt having made a comparative analysis between the true and false jalap, gives the following results:—

	True.	False.
Resin - - - -	17·63	3·23
Molasses obtained by alcohol	19·00	16.47
Brown saccharine extract -	9·05	5·92
Gum - - - -	10·12	3·88
Starch - - - -	18·78	22·69
Lignin and loss - -	25·40	47·81
	100·00	100·00

The rose-smelling jalap is also less purgative than the true.[2]

Medical properties and uses.—Jalap is a stimulant cathartic acting briskly on the bowels; and although occasionally griping severely, yet safe and efficacious. It is used in the same cases as scammony, whenever it is required effectually to evacuate the intestines; and as a hydragogue purgative it is supposed to possess singular efficacy. It has been asserted that it proves hurtful in

[1] *Pharm. centr. Blatt. fur* 1834, § 695. [2] *Pharmaceutical Journ.* vol. ii. p. 331.

hypochondriasis, bilious habits, and fevers, except of the intermittent kind; but Dr. Hamilton used it in all these instances, in typhus and the exanthemata, with the best effects.[1] The watery extract purges moderately without griping, and is therefore well adapted for children; but the alcoholic, whilst it purges, occasions the most violent tormina and gripings. It is frequently triturated with hard sugar, which renders its powder finer, and increases its activity; and with other cathartics, especially sulphate of potassa, by which the action of both is reciprocally improved. In dropsical affections, the bitartrate of potassa is a useful addition; and in the cachexiæ and worms it may be united with calomel, the operation of which it greatly quickens.

The dose is from grs. x. to ℨ ss. in powders, pills, or bolus; with a drop or two of volatile oil to prevent griping.

The *Jalapine* or jalap resin may be employed in place of the powdered jalap root, in doses of grs. iij. upwards.

Officinal preparations.—*Pulvis Jalapæ comp.* L. E. D. *Extractum Jalapæ*, L. E. *Tinctura Jalapæ*, L. E. D.

CONTRAJERVÆ RADIX. See *Dorstenia Contrajerva.*

COPAIFERA. *Spec. Plant. Willd.* ii. 630.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Leguminosæ.

G. 880. *Calyx* none. *Petals* four. *Legume* ovate. *Seed* one, with an ovate arillus.

Species 1. C. *Multijuga*, C. *officinalis.* Copaiva tree. *Med. Bot. 3d edit.* 609. *t.* 216. *De Candolle. Hayne*, x. 12—23.

Officinal. COPAIBA, *Lond. Edin. Dub.* OLEUM COPAIBÆ, *Lond. Edin.* Copaiba. Oil of Copaiba.

Syn. Beaume de Copahu (*F.*), Kopaiva Balsam (*G.*), Hwit Indiansk Balsum (*Swed.*), Balsum Copayve (*Dutch*), Copaiva Balsam (*Dan.*), Balsamo Copaiba, Balsamo Copau (*I.*), Copayva (*S.*). Kopaevoe (*Russ.*).

The copaiba tree is a native of South America and the Spanish West India islands. It grows in great plenty in the woods of Tolu, near Carthagena, and in those of Quito and Brazil. The C. *Langsdorffii*, designated by the London College, in 1836, as the source of copaiba, is a lofty, handsome tree, branching at the top, with a brownish ash-coloured bark. The leaves are large and pinnate, consisting of three to five pairs of ovate, pointed, alternate, equal-sided leaflets, one, two, or three inches long, entire, shining, veined, covered with pellucid dots, and placed on short slightly downy petioles. The *flowers* are in terminal racemes, which are stiff, spreading, and loosely divided into eight alternate common peduncles, with the flowers, which are white, sitting closely on them. The *calyx* is monosepalous and four-parted.

[1] *Observations, &c. on Purgative Medicines*, 8vo. *passim.*

There are no *petals;* the filaments are ten, slender, incurved, bearing oblong incumbent anthers; and the ovary is roundish, compressed, and on a short pedicel; it contains two ovules. The fruit is an oval, two-valved pod, containing a single egg-shaped seed, enveloped with a one-sided arillus.

Almost all the species of Copaifera[1] yield copaiva: but the greatest quantity is furnished by C. *multijuga,* a tree growing in the province of Para, and which, along with other species, is now (1851) referred to by the London College as the source of the balsam of copaiva. The copaiva of the shops is procured by wounding or boring these trees to the pith, near the base of the trunk, when it flows abundantly[2], in the form of a clear, colourless liquid, which is thickened, and acquires a yellowish colour by age. The operation is performed two or three times in the same year, the wound being closed with wax or clay if it does not spontaneously close. It is from the oldest trees that the best copaiva is obtained; and it sometimes flows so abundantly, that ten or twelve pounds are procured in a few hours. It is brought to this country from the Brazils, in small casks, each of which contains from one cwt. to one cwt. and a half of the balsam.[3] But another kind comes from the West Indies, and is supposed to be the product of C. *Iacquinii.*[4] Two kinds are known in British commerce:— 1. *Brazilian,* the most valued in England, is of a pale wine-yellow colour, transparent, with a resinous odour, and a bitter, somewhat acrid taste; 2. *West Indian,* darker coloured, and more acrid.

Qualities. — Genuine good copaiva has a peculiar but not disagreeable odour, and a bitterish, hot, nauseous taste. It is clear and transparent; its consistence is that of oil[5], the colour a pale yellow, and its specific gravity 0·950 to 0·966; but when it is exposed with an extended surface to the action of the air, it gradually thickens, until at length it becomes solid, dry, and brittle like resin. It is insoluble in water, but is completely soluble in alcohol, ether, and oils. Sulphuric acid converts it into a brown bituminous-like mixture, which gives out a strong odour of sulphur. Nitric acid, in the ordinary heat of the air, partially dissolves it, and renders it brown; but, at an increased temperature, the action is violent, the acid is decomposed, and nitrous fumes are copiously emitted. The hydrochloric and acetic acids scarcely

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[1] Those known and described are C. *Guaianensis.* C. *Langsdorffii,* C. *Beyrichii,* C. *Martii,* C. *multijuga,* C. *bijuga,* C. *nitida,* C. *laxa,* C. *cordifolia,* C. *Sellowii,* C. *oblongifolia,* C. *Iacquinii,* C. *coriacea.*

[2] "Tanta quantitate distillat, ut spatio trium horarum ad lb. xij effundat."—*Piso, Nat. Hist. 56.*

[3] The first account of copaiva was given by Maregrav and Piso in 1648.

[4] *Supplement to the Edin. New Dispens.*

[5] The adulterated copaiva, which Lewis mentions as being thick, white, and opaque, with a quantity of turbid, watery liquor at the bottom, is not now to be found.

affect it. The pure alkalies form with it white saponaceous compounds, which are soluble in water, forming opaque milky mixtures. It is soluble, also, in the expressed oils. Distilled with a gentle heat, a pleasantly odorous, volatile oil, of sp. gr. 876, passes over, *Oleum Copaibæ,* and a brown resinous substance remains in the retort, which gradually hardens and becomes brittle. Geber says, that recent copaiba yields 41 per cent. of *volatile oil,* 51·38 of *hard yellow resin,* 2·18 of *soft brown resin,* and 5·54 *water* = 100·00[1], and old copaiba only 31·70 per cent. of the *oil.* In destructive distillation it yields some *empyreumatic brownish-red oil,* an *acidulous water, carbonic acid gas,* and *olefiant gas,* but does not yield *benzoic acid.* Hence it approaches in its nature to the turpentines; and M. Blanchet has ascertained that the volatile oil has the same composition as volatile oil of turpentine. Formula $C_{10}\ H_8$. Its density is 0·881. When a stream of hydrochloric acid is passed through the oil, it yields crystals of artificial camphor, inodorous, transparent, and in the form of short rectangular prisms; and a brown thick oil, which has the odour of Siberian castor.[2] The yellow brittle resin is an acid, and termed *copaivic acid;* its formula is $C_{40}\ H_{32}\ O_4$.

Copaiva is sometimes adulterated with mastich and oil, and occasionally with turpentine, rape oil, and castor oil. Bucholz remarks, that if copaiva does not dissolve completely in a mixture of four parts of alcohol and one of rectified sulphuric ether, its adulteration may be inferred. The adulteration with castor oil is discovered by triturating three parts of the suspected balsam with one part of sulphuric acid: if it be pure, a plastic *reddish* mass will be formed; if it contain castor oil, the consistence is that of turpentine, and it is scarcely coloured. An easier mode is to agitate, in a bottle, one part of liquor potassæ with nine parts of copaiva; if the mixture remain cloudy, after standing at rest for some time, it contains castor oil. If copaiva be pure, it rapidly solidifies, and remains translucent when mixed with $\frac{1}{4}$ of its weight of carbonate of magnesia, aided by gentle heat: if this become opaque, the copaiva is impure, and contains a fixed oil.

Medical properties and uses.—Copaiva is stimulant, diuretic, and purgative. It possesses the power of diminishing excessive mucous discharges. It is taken into the circulation, and communicates to the urine its peculiar taste and odour. It was formerly used as an antiperiodic, but its employment as such has been long since discontinued. It has been recommended in pulmonary complaints; but where the excitement is morbidly increased, or when there is any degree of the inflammatory diathesis present, the heating and irritating quality of copaiva renders it injurious. From

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[1] *Journn. de Pharm.* xvi. 79.

[2] *Journ. de Pharm.* Feb. 1840, p. 70.

its power of stimulating the urethra, it is more successfully used in gleets, and has been administered for checking these for upwards of a century, and still retains its celebrity. It is equally efficacious in fluor albus, and in that state of the uterus sometimes occurring on the final cessation of the menses, which is accompanied with a sanious discharge, great bearing down, and many of the symptoms of incipient cancer. It certainly affords considerable relief in hæmorrhoidal affections; perhaps from its exciting the steady peristaltic motions of the intestines, at the same time that the determination of the blood to the hæmorrhoidal vessels is lessened by the stimulant effect of the remedy on the kidneys. In too large doses, it excites inflammation of the kidneys, and its use should always be avoided when ulceration of these organs is suspected. In gonorrhœa, even acute, it is now used in full doses with the best results. Velpeau in such cases recommends it to be administered as an enema to the extent of f ℥ j. in twenty-four hours: he usually adds a few drops of tincture of opium to prevent it from running off by the bowels.

The resin remaining after distillation by a gentle heat has been recommended by M. Thorn, as acting as efficaciously in gonorrhœa and gleets as the simple copaiba, without its nauseating properties.[1] But if this residue possess any influence, it must be imputed to some of the volatile oil remaining in it, as the pure resin is inert.

The dose of copaiva is from ♏ x. to f ʒ j., twice or thrice a day, either triturated with sugar into an oleo-saccharum, or mixed with soft or distilled water by means of mucilage or the yolk of an egg. It is now frequently given inclosed in capsules of gelatin, which dissolve in the stomach; but the necessity of giving indefinite doses is an objection to this mode of administration.[2]

The dose of the volatile oil is from ♏. v. to ♏. xxx.

Officinal preparations.— *Oleum Copaibæ,* E.

CORIANDRUM. *Spec. Plant. Willd.* i. 1448.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 552. *Corolla* radiate. *Petals* inflex-emarginate. *Involucre* universal one-leafed. The partial ones halved.

Species 1. C. *sativum.*[3] Common Coriander. *Med. Bot. 3d edit.* 137 *t.* 53. *Smith, Flor. Brit.* 320. *Eng. Bot.* 67. *Hayne,* vii. 13.

Officinal. CORIANDRUM, *Lond. Edin. Dub.* Coriander. Coriander seed. Fruit of Coriandrum Sativum.

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[1] *Thorn. Obs. on the Treatment of Gonorrhœa,* &c. Lond. 1827.

[2] These capsules may be prepared by dipping the bulbous extremity of an iron rod into a concentrated solution of gelatin, rotating the rod as it is withdrawn to diffuse the gelatin equally over it. As soon as it hardens, and the rod is withdrawn, it should be placed on a pin, fixed in a cork table, to dry. The capsule is then filled with copaiva, by means of a glass tube, and it is then closed by dropping some concentrated solution of gelatin on the orifice. Each capsule usually contains ten grains of copaiva.

[3] Κοριαννον, Dioscordis.

Syn. Coriandre (*F.*), Koriandor saamen; Schwindelkerner (*G.*), Koriander (*Dutch, Swed. & Dan.*), Koryander (*Pol.*), Cocutro, Coriandro (*Port.*), Coriandro, Coriandolo (*I.*), Semilla de Cilantro (*S.*), Cottamillie (*Tam.*), Mety (*Malay*), Kezereh (*Arab.*) Kitnuz (*Pers.*), D'hanya (*H.*), D'amyáca (*San.*)

This plant is an annual, a native of Tartary, the Levant, and Italy; but is now found wild in some parts of this country[1], owing to the abundant cultivation of it for medicinal purposes. It flowers in June, and ripens its fruit in August. The stem is erect, about two feet in height, branching, divaricated, round, smooth, and obscurely striated. The leaves are compound; the lower ones pinnated, with gashed, wedge-shaped, somewhat roundish leaflets, and the upper thrice-ternate, with linear-pointed segments. Both the umbles and umbellules are many-rayed; with an involucre of one linear leaf, and involucels of three lanceolate narrow leaves, all on one side. The *flowers* are of a white or reddish colour, The *calyx* consists of five sepals; the *petals* are five also, oblong. and inflected at the tips, but those of the flowers of the circumference have the outermost petals larger, and not inflected. The *fruit* is globular, obscurely ribbed, and divisible into two concave hemispherical seeds with large interior vittæ; and this form of the fruit distinguishes coriander from all the other species of umbelliferæ. The whole plant, when green, has an abominable fetid odour if bruised, which extends even to the fruit.[2]

Qualities. — The dried seeds have a grateful aromatic odour, and a moderately warm pungent taste; qualities which depend on a *volatile oil*, that can be obtained separate by the distillation of the seeds with water. *Tromsdorff* procured 13 per cent. of a *fat oil*, insoluble in alcohol.[3] Their active principles are completely extracted by alcohol, but only partially by water.

Medical properties and uses. — These seeds are carminative and stomachic. They are sometimes used in flatulencies: but principally to cover the unpleasant taste, and correct the griping quality of some cathartics. The dose is ℈ j. to ʒ j., bruised.

It is contained in some officinal preparations of senna.

CORNU. See *Cervus.*

CREASOTUM. *Lond. Edin. Dub.* Creasote.[4] An oxy-hydro-carburet prepared from pyroxylic oil, L.

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[1] About Ipswich, and some parts of Essex. *Smith.* It is also found near the Red House, Battersea.

[2] Hence, Alston imagined that the name of the plant comes from κορις, a bug. — *Mat. Med.* ii. 349.

[3] *Archiv. für Pharm.* ii. 2.

[4] Named from χρεάς, flesh, and σωζω, I save, on account of its preserving meat. A solution of 1 part in 400 parts of water, will preserve meat, which has been immersed in it for an hour, unchanged even during summer.

This substance is prepared from the oil of wood tar. It was first procured by Reichenbach in 1830, as one of the products of the destructive distillation of wood, and exists in impure pyroligneous acid. It is now prepared in this country from Archangel tar.[1]

In order to procure creasote, tar is distilled until paraffine begins to come over in white fumes. The heaviest stratum of the product is then agitated with carbonate of potassa, to free it from acetic acid; after which the oily fluid is separated from the acetate by distillation, and the first portions are rejected. Some phosphoric acid is then added to the product to neutralise ammonia, and it is distilled a second time. What comes over is a mixture of *eupione* and *creasote.* This is then agitated with a strong solution of potassa, which combines with and dissolves the creasote: this compound is then neutralised by sulphuric acid, and the fluid which separates after another distillation is impure creasote. It is purified by repeatedly treating it with potassa, and as frequently redistilling.

Qualities. — Creasote, when pure, is a colourless, limpid, oily-looking liquid, having a sp. gr. of 1·067. It has a hot, pungent taste, which leaves a degree of sweetness on the palate: its odour resembles that of impure pyroligneous acid, or smoked ham. When pure, it is not altered by exposure to light. Heat has a singular influence in augmenting its bulk: it extends to one sixth between 70° and 397°, at which temperature it boils. It is soluble in water in two proportions, or rather forms two combinations with that fluid; one contains 100 parts of creasote and ten parts of water. The other contains 400 parts of water to one part of creasote; and in every proportion in alcohol and ether, naphtha, volatile and fixed oils, and acetic acid. It unites with chlorine, iodine, bromine, sulphur, the alkalies, and the earths; but the latter compounds are decomposed by weak acids. The strong mineral acids decompose it. It coagulates albumen, and reduces nitrate of silver. It is a compound of carbon, hydrogen, and oxygen; according to Ettling, in the proportions $C_{14}\ H_7\ O_2$: some analyses give $C_{28}\ H_{16}\ O_4$, and others $C_{12}\ H_8\ O_2$.

Creasote is frequently adulterated, but its admixtures are easily detected. Strong acetic acid should dissolve pure creasote, so that whatever floats upon the surface of this solution is either fixed or volatile oil, or *eupion* or *capnomor.* Fixed oil is detected by its leaving a stain on paper, moistened with creasote, and dried at a low heat. If it contain brown colouring matter, this soon appears on exposing the creasote to the sun's rays.

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[1] *Christison's Dispensatory.*

According to the London College, it should be "free from colour, of a peculiar odour, soluble in acetic acid. Its specific gravity is 1·046. When it is dropped upon bibulous paper, and a boiling heat applied, it is dissipated without leaving a transparent stain." The Edinburgh and Dublin Colleges state its specific gravity to be 1·066.

Medical properties and uses.—Creasote is a powerful stimulant, displaying, according to circumstances, sedative, irritant, narcotic, anodyne, diuretic, antiseptic properties. In large doses it is destructive to animal life; and even its aqueous solution kills fish, insects, and plants. When taken in poisonous doses by man, its symptoms are heat and pain in the gullet, vertigo, dimness of sight, vomiting, depressed action of the heart, insensibility, convulsions, and coma. In moderate doses, internally administered, it acts as a sedative, and is advantageously administered in cases of anorexia and affections of the stomach depending on functional diseases of that organ. It has a powerful influence in allaying the severe vomiting which often accompanies pregnancy, and also that of sea-sickness, and has been employed, by some, it is said, with advantage in diabetes mellitus. Its chief value consists in its powerful influence in relieving rheumatic and neuralgic pains, when it is externally applied. Dropped into a carious tooth it relieves tooth-ache, without injuring further the tooth. It operates, also, as a styptic, when topically applied in hemorrhages; and in arresting caries in bones. As an anodyne it allays the pain and mitigates inflammation in recent burns. I have found it useful, in the form of ointment, as a topical application in lepra, combined with calomel. It has also been used with advantage in porrigo *scutulata.*

The dose is from ♏ ij. to ♏ x. in a glassful of water, or any bitter aqueous effusion.

Officinal preparations. — *Unguentum Creasoti,* L. E. D. *Mistura Creasoti,* E.

CRETA. See *Calx.*

CROCUS. *Spec. Plant. Willd.* i. 194.

Cl. 3. *Ord.* 1. Triandria Monogynia. *Nat. ord.* Iridaceæ.
G. 92. *Corolla* six-parted, equal. *Stigma* convoluted.
Species 1. C. *sativus.*[1] Common Saffron. *Med. Bot. 3d. edit.* 763. *t.* 259. *Miller's Gard. Dict. Smith, Flora Brit.* i. 39.
C. *autumnalis.* C. *officinalis, Mart. Fl. Rust. t.* 58. *Eng. Bot. t.* 343. *Hayne,* vi. 25.
Officinal. CROCUS, *Lond. Edin. Dub.* The stigmas of the Saffron, or Crocus Sativus.

Syn. Saffran (*F.*) Safran (*G. Dan.*), Saffran (*Dutch, Swed.*), Zafferano (*I.*),

[1] Κροκος, Dioscoridis. Its English name is derived from the Arabic Sapharan. *Celsus.* See *Alston's Lectures,* ii. 119.

Azafran (*S.*), Açafrão (*Port.*), Szafran (*Pol.*), Schafran (*Russ.*), Khoongoomapo (*Tam.*), Zafran (*Arab.*), Abeer (*Pers.*), Safaron (*Malay*), Khohom (*Cyng.*), Cashmeerum (*Sans.*).

Common saffron is a perennial bulbous plant, found wild in some parts of this country, which affords reason for supposing it to be indigenous; but it is probable that it was originally brought from Greece or Asia. It is cultivated for medicinal use, in great abundance, in Cambridgeshire and Essex. Formerly, it was chiefly grown at Saffron Walden, but it is now confined to Stapleford. It flowers in September. The *cormus* is solid and depressed, and covered with a reticulated brown coat, which separates above into fibres. The *leaves* are linear, a little revolute, of a deep rich green colour, with a white nerve in the centre, and enclosed with the tube of the flower in a long membranous sheath. The *flower*, which appears before the leaves, is sessile on the cormus, of a violet or lilac colour, and raised on a long slender white tube. The *corolla* is parted into six nearly elliptical segments; the *stamens* are shorter than the corolla, and erect; and the *style*, which is the length of the corolla, hangs out at one side between the segments. The *stigma* is deeply three-parted, of a rich orange-colour, pendulous, and odorous; with the segments linear-involute at the margin, and crenate at the apex. The flower never varies.

For the preparation of the saffron, the flowers are gathered early in the morning, just as they are about to blow. They are then spread upon a table, and the stigmas, with a proportion of the style, carefully picked out of the flower, which is thrown away as useless. The stigmas are then dried upon paper, in a portable kiln of a peculiar construction, over which a hair-cloth is stretched, and over it several sheets of white paper are laid; upon which the wet saffron is spread between two and three inches thick. This constitutes *hay saffron.* When it is now covered with other sheets of paper, and over them is laid a coarse blanket, five or six times doubled, which is pressed down with a board and a large weight after the fire is lighted, *cake saffron* is formed. The first heat is strong, to make the saffron sweat; and after an hour, the saffron being turned, the same degree of heat is continued for another hour. The fire is then reduced; and a moderate degree of heat is kept up for twenty-four hours, during which time the saffron is turned every half hour, so as to dry it thoroughly. It is then fit for the market. The finest is the *hay saffron;* the *cake saffron* is now seldom or never prepared in England; and indeed English saffron is now rarely found in the shops: that from Sicily, France, and Spain, supplying the place of the English.

The Spanish hay saffron, *crocus in fœno,* which used to be generally spoiled with oil, in which it was dipped with the intention of preserving it, is now the best hay saffron of the shops: the French is little valued. Saffron is sometimes adulterated with fibres of smoked beef, the petals of the safflower (*Carthamus tinc-*

torius), and of officinal marigold (*Calendula officinalis*); or saffron, from which tincture or infusion has been drawn, is mixed with a little good saffron. These frauds are detected by infusing the suspected saffron in hot water, when the expanded stigmas will be easily distinguished from the florets of the other flowers: and the deficiency of the presence of colour and odour, or an unpleasant odour arising when the saffron is thrown upon red-hot coals, will indicate the presence of the other fraudulent ingredients. They are also detected by dropping into the infusion nitrate of silver, or solution of perchloride of iron; which, if the adulterations are present, render the infusion opaque, and a precipitate forms. Saffron in hay should be chosen fresh, moderately moist, and possessing in an obvious degree all the under-mentioned sensible qualities: the not staining the fingers but making them oily, its exhaling a musty flavour; or displaying a whitish-yellow or a blackish colour, indicate that it is bad, or too old.

Qualities.—Good saffron has a sweetish, penetrating, diffusive odour; a warm, pungent, bitterish taste; and a rich deep orange-yellow hue in the hay. It yields its colour and active ingredients to water, alcohol, proof spirit, wine, vinegar, and, in a smaller degree, to ether. By distillation with water it affords a small quantity of a heavy golden-yellow coloured volatile oil; and it is to this oil that saffron owes its active properties: 32 parts of saffron yield one of oil. The watery infusion, which has a deep orange-colour, is rendered, when much concentrated, of a very deep purple by strong sulphuric acid, the mixture emitting the smell of vinegar, and yielding a copious black precipitate when diluted with water: chlorine produces a copious yellow precipitate, the liquid retaining only a very pale lemon-colour. Saffron contains a principle called *polycroite*, which, when pure, occurs as a scarlet powder, so named by Bouillon la Grange from its assuming different colours, when acted upon by oil of vitriol, first becoming blue, then lilac: nitric acid turns it green. M. Henry has demonstrated that it contains *volatile oil*, upon which the stimulant influence of the drug depends. I have found that it contains *resin* also; for sulphuric ether digested on saffron is coloured, and when evaporated on the surface of water, a pellicle of resin is left, whilst the coloured extractive, which is taken up with the resin, is dissolved in and colours the water. According to Aschoff it contains 1·4 of *volatile oil*, 4·0 *wax*, 52·0 *polychroite*, 10·4 *gum*, 2·0 *balsamic matter*, soluble in ether and alcohol, 19·0 *lignin*, and 10 *water* = 100·0.[1]

Medical properties and uses.—Saffron is regarded as a stimulant and antispasmodic; but, from the experiments of Dr. Alexander[2], its powers appear to be inconsiderable. It was known to the

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[1] *Gmelin, Handb. d. Chim.* ii. 1334.

[2] *Experimental Essays*, p. 88.

ancients, who considered it as a remedy of great activity; in moderate doses exhilarating the spirits, easing pain, and producing sleep; but occasioning headachs, coma, delirium, convulsive laughter, and even fatal effects, when given in large doses. It is still regarded by the continental physicians as a narcotic. It was formerly confided in as an emmenagogue, in this country, and it is still employed as such on the Continent. In modern British practice, however, it is scarcely ever given except as a cordial adjunct to more active remedies; and as a colouring agent in some pharmaceutical preparations. The dose in substance is from grs. x. to ʒ ss.; but it has been given in much larger doses without any sensible effect.

Officinal preparations. — *Syrupus Croci*, L. E. D. *Tinctura Croci*, E. D.

CROTON. *Spec. Plant. Willd.* iv. 531.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Euphorbiaceæ.
G. 1718. *Male.* *Calyx* cylindrical, five-toothed. *Corolla* five-petalled. *Stamens* 10—15.
Female. *Calyx* many-leaved. *Corolla* none. *Styles* three, bifid. *Capsule* three-celled. *Seed* one.
Species 43. C. *Cascarilla, Don. Ed. Phil. Journ.* C. *Eleuteria, Med. Bot. 3d edit.* 633. *t.* 223. *Sloane's Jamaica*, vol. ii. *t.* 174. *Lindley's Flora Medica*, 180.
Species 36. C. *Tiglium.* Purging Croton. *Flor. Zeyl.* 343. *Rumph. Amboyn.* iv. p. 98. *t.* 42. *Rheede Malab.* ii. p. 61. *t.* 33. *Ray, Hist. Plant.* 167. *Ainslie's Mat. Med. of Hindostan*, 4to. pp. 96. 291. *Med. Bot. 3d edit.* vol. v. p. 71. *Hayne*, 170.

1. CROTON CASCARILLA? C. ELEUTERIA.

Officinal. CASCARILLA, *Lond. Edin. Dub.* Cascarilla bark. Bark of Croton Eleuteria.

Syn. Cascarille (*F.*), Cascarillrinde (*G.*), Kaskerilla (*Dutch*), Kaskarillo (*Dan.*), Kaskarilla (*Belg.*), Caskaril (*Swed.*), Cascariglia (*I.*), Chacarilla (*S.*), Cascarilha (*Port.*), Szakaryla (*Russ.*).

Much difference of opinion still exists respecting the real source of this valuable aromatic bark. Schiede refers it to the Croton *Pseudo-China*, an opinion which was adopted by the late Professor Don[1]; but Dr. Pereira has clearly pointed out the error of this opinion. The C. *Pseudo-China* yields what is termed *Calpachi bark*, not our Cascarilla; and I am satisfied of the correctness of Dr. Lindley's opinion, that the Cascarilla of our shops is the bark of C. *Eleuteria.* This tree is a native of the Bahama islands, and

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[1] Notwithstanding Mr. Don's opinion, C. *Cascarilla* is the wild rosemary of Jamaica; but Cascarilla comes from the Bahamas.

has been found in Jamaica by Dr. Wright. It is a small tree, seldom exceeding twenty feet in height, and branching thickly towards the top. The more tender branches are angular and somewhat compressed. The leaves are alternate on short petioles, ovate, with a short, obtuse apex, which is blunt, entire, slightly nerved; on the upper surface, of a bright green colour, with a few scattered leprous dots; silvery and densely downy beneath. The flowers are in axillary and terminal racemes; branched or compound; the branches divaricating, covered with closely parted, subsessile, monœcious flowers. The petals are whitish, oblong, obtuse, and spreading. The male flowers are uppermost, and have ten subulate filaments, supporting erect compressed anthers; the female flowers produce a roundish ovary, crowned with three bifid spreading styles, with obtuse stigmas. The capsule is roundish, superior, small, nearly trilocular, and contains three cells, with three furrows, and six valves.

Cascarilla bark is imported chiefly from Nassau, one of the Bahama islands, packed in chests and bales. It consists of pieces about six or eight inches long, scarcely one-tenth of an inch thick, quilled, compact, brittle, with a resinous fracture. The epidermis is sometimes cracked both longitudinally and transversely; and covered with lichens, particularly Graphides[1] and a Lecidea: the former give the bark a snowy whiteness on the surface; whilst the latter appears as black spots on a white ground.

Qualities.—Cascarilla bark has a pleasant spicy odour, and a bitter, warm, aromatic taste. The colour of the inside of the pieces is a reddish-cinnamon hue, and their fracture of a dark reddish-brown. It is very inflammable, and is easily distinguished from all other barks by emitting, when burnt and extinguished, a fragrant odour, resembling that of musk, but more agreeable. Its active constituents are partially extracted by alcohol and water, and completely by proof spirit. Ether takes up one and a half in ten parts; and, when evaporated on the surface of water, leaves a thick pellicle of bitter oleo-resin; and, dissolved in the water, a small portion of almost colourless, pungent extractive. According to Tromsdorff, who analysed it, 4696 parts yielded the following products:—*Gum* and *bitter principle* 864, *bitter resin* 688, *volatile oil* 72, *water* 48, a trace of *chloride of potassium*, and *woody fibre* 3024 parts.[2] The volatile oil is lighter than water, sp. gr. ·938: it consists of two oils, a heavy and a light oil; the former containing no oxygen, the latter oxydized. The ethereal tincture shows ex-

[1] Forty species of Lichens are mentioned by M. Fee—among others, G. *tortuosa*, G. *packnades*, G. *Cascarillæ*, G. *lineola*, G. *Serpentina*, G. *Caribæa*, G. *Afzelii*: the most frequent is Lecidea *Artharioides*, which is readily distinguished by its white thallus, and black, circular apothecia.

[2] *Annales de Chimie*, xxii. 219. Brandes has announced the presence of an alkaloid, *Cascarillin*, but this wants confirmation.

tractive to be present, of a greenish-yellow colour, very fragrant and pungent. Proof spirit is its proper menstruum.

Medical properties and uses.—This bark is a valuable excitant and tonic. It was introduced into practice as such in 1690 by Professor Stisser; and was afterwards much used in Germany, particularly by the Stahleans, as a substitute for cinchona bark in the cure of intermittent and remittent fevers[1]; but although they overrated its virtues, yet it is an excellent adjunct to the bark in these diseases: rendering it, by its aromatic qualities, more agreeable to the stomach, and increasing its powers. It is one of the best tonics in convalescence and in atonic dyspepsia. It is successfully employed in asthma and flatulent colic; the latter stage of dysentery and diarrhœa, particularly when occurring after measles; and in the gangrenous thrush peculiar to children.[2] The dose of the powdered bark is from grs. xij. to ℨ j. three or four times a day.

Officinal preparations. — *Infusum Cascarillæ,* L. E. D. *Tinctura Cascarillæ,* L. E. D.

2. CROTON TIGLIUM.

Officinal. TIGLII OLEUM, *Lond. Dub.* CROTONIS OLEUM, *Edin.* Oil of Croton, or Tiglium, expressed from the seeds.

Syn. Huile de Croton (*F.*), Crotonöl (*G.*), Olio di Croton (*I*), —— Nervallum cottay unnay (*Tam.*), Iummal Gota (*Duk.*), Nepala (*Sans.*), Napulum vittilo noonay (*Telingoo*), Dund (*Pers.*), Batoo (*Arab.*). Beri (*Malay*).

The plant yielding the seed from which this oil is expressed is a native of the Molucca islands, Ceylon, and of the greater part of the peninsula of India. It is a middle-sized tree, has an arboreous stem, covered with a soft, blackish, shining bark. The leaves are alternate, oval-oblong, three to five-nerved at the base, acuminate at the apex, serrated and smooth, with two glands covered with stellated hairs seated at the base; they are supported on channelled petioles shorter than the leaf. The flowers are downy, in erect terminal racemes, with downy pedicels; male at the apex, female below. The male has a five-cleft calyx, five lanceolate woolly petals, and fifteen distinct stamens. The female has the styles long and bifid; the capsules oblong, obtusely-triangular, the size of a hazel nut, and covered with stellated hairs; and trilocular. The seeds are oblong, about the size of a large coffee bean, four-sided, flattish on two sides, and convex on the other, with four elevated ridges, running at equal distances from the base to the apex of the seed. The shell of the seed is black; but it is covered with a soft pale yellowish-brown epidermis. The seeds abound in oil.

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[1] It was formerly often sold for the Peruvian bark, and hence was called *Kina kina aromatica, Cortex Peruvianus grisseus, China china fœmina, China china spuria, Cortex china nova.*

[2] *Underwood, Diseases of Children,* 4th edit. i. 79.

Croton seeds are imported into this country in cases; and, owing to the rubbing of the epidermis, when the cases are not completely filled, they have generally a mouldy appearance. In this state they were formerly known in Europe under the name of *Grana Tiglia*[1], *Molucca grains;* but as they were discarded from medical practice on account of their very drastic effects, arising from the imprudent manner in which they were exhibited, they ceased to be an article of commerce, until 1819, when the expressed oil was introduced by Mr. Conwell as a purgative.[2] One hundred parts of the kernels of the seeds when bruised yield 60 of acrid oil, and 40 of farinaceous matter. The acrid principle resides chiefly in the testa or skin of the cotyledons, and the corculum or embryon, and is mixed with the oil of the cotyledons in its expression. The goodness of the oil, therefore, depends on the seeds being shelled before they are bruised. In India the seeds are prepared for medicinal use by slightly roasting them, which enables the testa to be readily separated. One or two grains act as a powerful cathartic. One hundred parts of the seeds consist of 36 parts of testa and 64 of kernel. The kernel yields 60 per cent. of oil.[3] The seeds themselves are about the size of a pea, of a somewhat quadrangular form, of a grayish or blackish-brown, as we receive them. The inner seed coat is thin, brittle, and of a pale hue; the kernel consists of a pale yellowish-white oily albumen, which incloses an embryo with foliaceous cotyledons. They are inodorous, and at first tasteless, but soon impress a hot burning taste on the palate. According to Brandes they consist of 17 per cent. *of fixed oil,* with *crotonic acid,* and *crotonin,* an alkaloid, a trace of *volatile oil,* 0·32 of *colouring matter* and *crotonates,* 1·00 *brownish-yellow resin,* insoluble in ether, 0·64 *stearine* and *wax,* 2·05 *extractive, sugar* and *malates,* 5·71 *starchy matter,* with *phosphate of lime* and *magnesia,* 10·17 *gum* and *gum-resin,* 1·01 *albumen,* 2·00 *gluten,* 39 *seed coats,* 22·50 *water* = 100·41.[4] It has been found that the *crotonin,* the supposed alkaloid of Brandes, is only a magnesian soap, having an alkaline reaction. The *crotonic acid* exists in the seeds in the free state. It is, when pure, a volatile acid, congealing at 23° F.; yielding, when heated a little above 32° F., vapours which are exceedingly acrid. It seems, however, from Mr. Redwood's and Dr. Pereira's experiments, that crotonic acid and the crotonates are not the active principles of the seeds, for when separated they have no well-marked action.

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[1] Dr. Francis Hamilton informs us that these were the seeds of C. *Pavana. Linn. Trans.* xiv. p. 528,

[2] They were known to the ancient Arabian physicians under the name of *Dende;* but although prescribed by European practitioners in the seventeenth century, yet they were lost sight of, until again introduced to notice by my late friend Sir Whitelaw Ainslie, in his *Mat. Med. of Hindostan.*

[3] *Nimmo.*

[4] *Gmelin, Handb. d. Chim. Bat.* ii. 8. 1320.

Qualities.—Croton oil, which is partly imported from India, partly expressed in London, is of a pale reddish-yellow colour, but that from India is much paler than the European. Its taste is hot and acrid; and it leaves an uneasy feeling in the mouth and throat, which continues for many hours. Even a minute portion of the kernel of the seed, when chewed, leaves a hot pungent sensation on the tongue, which remains for twenty-four hours. The oil is wholly soluble in ether and oil of turpentine. Alcohol takes up two parts out of three, and the solution possesses the acrimony and the cathartic properties of the oil, whilst the undissolved portion is devoid of acrimony, and inert when taken into the stomach.

The oil obtained from India differs from that expressed in England in its relations to alcohol. The English oil is quite soluble in alcohol, without heat; but the Indian forms an opaque mixture, which becomes clear when heated, and separates, by rest, into two parts — one of alcohol, and the other of the oil, increased slightly in bulk from retaining some of the alcohol. By artificial cooling the English oil can be made to separate from the alcohol.

In the Edinburgh Pharmacopœia, the following test is given to ascertain the purity of this oil. "When agitated with its own volume of pure alcohol and gently heated, it separates, on standing, without having undergone any apparent diminution." From what is stated above, this test cannot be relied upon in the case of the English oil.

Croton oil may be adulterated with castor oil, Jatropha oil; also, it has been stated to be occasionally mixed with Canada balsam.

Medical properties and uses.—Croton oil is a powerful hydragogue purgative, operating in a very short time after it is taken. It has been given with great advantage in cases of obstinate constipation, convulsions, mania, apoplexy, and other diseases which require, along with the complete evacuation of the intestines, the lessening the circulating mass. The smallness of the dose in which this oil produces its effects requires the greatest caution to be observed in its administration, as it has occasionally induced the most dangerous hypercatharsis. It is equally powerful if a drop or two be only laid upon the tongue; hence its value in cases where deglutition is impeded, or where patients obstinately refuse to take medicine, as in mania. It is said that it operates when rubbed upon the skin, if diluted with alcohol. I have never witnessed its effects when thus used. In India, where it has long been used, ghee or butter, with orange or rice-water or cold buttermilk, and the affusion of cold water, are employed to counteract its too violent effects, when these occur. Its administration proves hurtful in subacute or irritable states of the mucous membrane, and it is equally improper in much debilitated habits. It is also used in India as an emmenagogue with excellent effects; and

as an *external application* in rheumatic affections.[1] It acts as a counter-irritant. Diluted with two parts of olive oil, it produces an eruption of small pustules on the skin; but its only advantage over other counter-irritants is the rapidity of its action. In some instances the undiluted oil is used for this purpose.

Croton oil is generally administered in doses of from one to two, and in some cases five drops, made into pills with crumb of bread; or combined with mucilage of gum, sugar, and almond mixture, in the form of emulsion. Dr. Nimmo recommends the saturated alcoholic solution, in the dose of f ʒ ss. rubbed up with simple syrup, and mucilage of gum, of each ℥ ij., and ℥ iv. of distilled water.[2] Mr. Morson, of Southampton Row, Bloomsbury, prepares a soap which is a crotonate of soda, as a substitute for the oil. The seeds, when two or three have been taken internally, have proved poisonous, and even the inhalation of the dust has caused death.[3]

CUBEBA. See *Piper Cubeba.*

CUCUMIS. *Spec. Plant. Willd.* i. 611.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Cucurbitaceæ.
G. 1741. *Male. Calyx* five-toothed. *Corolla* five-parted. *Filaments* three.
Female. Calyx five-toothed. *Corolla* five parted. *Pistil* three-cleft. Seeds of the *gourd* argute.
Sp. 1. C. *vel Citrullus Colocynthis.*[4] Bitter Cucumber. *Med. Bot.* 3*d edit.* 189. *t.* 71. *Hayne,* 174.
Officinal. COLOCYNTHIS, *Lond. Edin. Dub.* Coloquintida, or Bitter Cucumber, the pulp of the fruit, the decorticated fruit.

Syn. Coloquinte (*F.*), Koloquinte (*G.*), Koloquint (*Dutch, Swed.*), Coloquinder (*Dan.*), Colosint (*Russ.*), Colloquintida (*I.*), Pepinero Coloquintida (*S. Port.*), Hunzil (*Arab. Pers.*), Indraini (*H.*), Indraváruni (*San.*), Makkul (*Ben.*), Peycoomutikai (*Tam.*), Dahuk (*Egypt.*).

This plant is an annual, a native of Turkey and Nubia[5], flowering from May till August, and much resembling the cucumber in its herbage. The root is branching and strikes deep into the ground. The stems are trailing, beset with rough hairs; the leaves are on long petioles, of a triangular form, variously sinuated, obtuse, of a fine green colour on the upper surface, and whitish and rough beneath. The flowers are solitary, axillary, and of a yellow colour. The calyx of the *male* flowers is bell-shaped; the corolla

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[1] *Mat. Med. of Hindostan,* 4to. Madras, 1813. The solution of the oil in oil of turpentine produces a pustulous eruption when it is applied to the skin.
[2] *Journ. of Science,* vol. xiii. p. 69.
[3] *Pereira's Elements.*
[4] Κολοκυνθις, Dioscoridis.
[5] Burkhardt, in his Travels through Nubia, 4to. p. 184., says, "The ground was covered with the coloquintida, a plant very common in every part of this desert (Wady Om-gat)."

the same shape with the limb, divided into five-pointed segments; and the anthers, which are five, stand on three short filaments, or are triadelphous, long and erect. The *female* flower is like the male, the stigmas three, thick and bipartite. The fruit is a round *berry* or *pepo*, the size of a small orange, yellow, and smooth on the outside when ripe; trilocular, each cell containing many ovate, compressed, whitish seeds, enveloped by a white spongy pulp.

The fruit is yellow when ripe; it is gathered in autumn. It is then peeled and dried in a stove; and in this state it is brought to this country. When it is larger than a St. Michael's orange, and has black acute-pointed seeds, it is not good. It is occasionally imported without being peeled. In both states its pulp is light, white, papery, porous, and tough. Two kinds are known in the market: namely, *Turkey Colocynth*, which is irregularly globular, white or pale straw colour: *Mogadore Colocynth*, which is larger and covered with a smooth, firm rind. The latter is rarely used in medicine.

Qualities.—Dried coloquintida is inodorous: but has an extremely bitter nauseous taste, and the pulp feels mucilaginous when chewed. Independent of the seeds, it is altogether composed of a very light, easily torn, white, cellular matter. Ether, alcohol, and water extract its virtues. The infusion in boiling water has a golden-yellow colour, gelatinizes as it cools, and resembles, except in colour and taste, mucilage of quince-seed. The cold infusion is pale-yellow, and as bitter as the hot. The mucilage is soluble in cold water. Alcohol and all the acids coagulate both infusions; and they are precipitated by solutions of acetate and diacetate of lead, sulphate of copper, and nitrate of silver. Sulphate of iron strikes with it a deep-olive colour. Its colour is rendered greenish by solution of potassa, which precipitates it: but the mucilage is dissolved by solution of ammonia. Ether, digested on the pulp, deposits, when evaporated on the surface of water, a white, opaque, bitter resin, and some extractive; from which the water acquires the bitter taste of the fruit, and precipitates solutions of potassa, nitrate of silver, and the acetates of lead. From these experiments colocynth pulp should consist chiefly of *gum resin*, a *bitter principle*, and some *tannic acid*. According to Meissner's analysis, it contains 14·4 per cent. of *colocynthin*, 10·0 *extractive*, 4·2 *bitter fixed oil*, 13·2 *resin insoluble in ether*, 9·5 *gum*, 17 *gummy extract* (procured by acting on the lignin by potassa), 5·7 *phosphate of lime* and *magnesia;* and the remainder *lignin* and *water*. M. Vauquelin found that an alcoholic tincture formed from the residue of a strong decoction of colocynth, when evaporated and washed with a little water to free it from some acetate of potassa, yields a brittle orange-yellow substance, partially soluble only in water, the residue being a white, filamentous mass, changing to yellow. This substance he has named *Colocynthine;* and he regards it as the active prin-

ciple of the drug.[1] It is more readily prepared by evaporating an infusion made with cold water, which yields it in the form of a brown brittle mass. Colocynthine is more soluble in alcohol than in water. It is precipitated by infusion of nutgalls. Very little is known regarding this principle.

Medical properties and uses.—The pulp of this fruit is a very powerful drastic cathartic. It acts chiefly on the intestinal exhalants, consequently as a hydragogue. It also acts on the rectum. It was employed by the ancients in dropsical, lethargic, and melancholic affections; but always with caution, on account of its violent effects. Orfila, from his own observations, asserts that one or two drachms of it only, applied to the cellular tissue of the interior of the thigh of a man, produced death in the space of twenty-four hours.[2] When given alone, even in moderate doses, it purges vehemently, producing violent gripings, bloody dejections, and, not unfrequently, convulsions and inflammation of the bowels: and post-mortem examinations have displayed inflammation also of the liver and the kidneys. The watery decoction, or the infusion, is much less violent in its operation, and has been recommended in worm cases. It is scarcely ever given alone in any form, but is generally united with other purgatives to quicken their operation. It is a common purgative in habitual costiveness. As a hydragogue in dropsy, I have found it less useful than jalap, and far less so than elaterium. It is said sometimes to operate as a diuretic. The dose is from gr. j. to grs. v. triturated with almonds, or gum, or some farinaceous matter.

Officinal preparations. — *Enema Colocynthidis*, L. *Extractum Colocynthidis*, L. E. *Pilulæ Colocynthidis comp.* L. D. *Pilulæ Colocynthidis*, E. *Pilulæ Colocynthidis et Hyoscyami*, E.

CUMINUM. *Spec. Plant. Willd.* i. 1440.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.
G. 547. *Fruit*, ovate, striated. *Partial umbels* four. *Involucre* four-cleft.
Sp. 1. C. *Cyminum.*[3] Cumin. *Med. Bot.* 3*d edit.* 143. *t.* 56. *Hayne*, vii. 11.
Officinal. CYMINUM, *Lond. Edin.* Cumin. Fruit of Cuminum Cyminum.

(*Syn.*) Cumin (*F.*), Romischer Kumel (*G.*), Komijn (*Dutch*), Kummen (*Dan.*), Spys Kummen (*Swed.*), Semenza di Comino (*I.*), Semilla de Comino (*S.*), Cominho (*Port.*), Kmin (*Pol.*), Siragum (*Tam.*), Zereh (*Pers.*), Jantan (*Malay*), Kimoon (*Arab.*) Irá (*H.*), Iraca (*San.*), Jeera (*Beng.*).

This plant is an annual, a native of Egypt and Ethiopia, but it

[1] *Journ de Pharm.* 1824, p. 416.
[2] *Leçons faisant partie des Cours de Méd. Legale*, de M. Orfila. Thunberg says that the recent fruit is eaten pickled. — *Travels*, vol. ii. p. 171.
[3] Κυμινον, Dioscoridis.

is cultivated in great abundance in Sicily and Malta. It flowers in June. It rises ten or twelve inches in height, on a slender, round, often procumbent, branching stem. The leaves are of a deep green colour, narrow, linear, and pointed; the leaves are filiform; the flowers reddish-purple, in numerous four-rayed umbels; with umbellets having seldom more than four flowers. Both the involucres and involucels consist of three or four subulate, unequal leaflets. The corolla is composed of five unequal petals, inflected, and notched at the apex; the filaments support simple anthers; and the germen is inferior, large, ovate, with two minute styles terminated by simple stigmas. The fruit consists of two oblong, striated mericarps, united by their flat sides, of a pale brown colour, minutely bristled on the channels, less densely on the ridges, which are paler, filiform, and a little raised.

Cumin is imported from Sicily and Malta.

Qualities. — The fruit, or cumin seed as it is often erroneously termed, has a light brown-yellow colour. It has five primary ridges, filiform and prickly, and four secondary, prominent and also prickly, and under each of these is one vitta. The dried fruit has a strong, peculiar, heavy odour, and a warm, bitterish, disagreeable taste. Water extracts little more than their odour; but alcohol takes up both odour and taste; and yields, when evaporated, an extract containing the sensible qualities of the seeds. In distillation with water, a large proportion of pale-yellow, pungent, volatile oil comes over, which has the strong ungrateful odour of the seeds, and is very acrid. It consists of two bodies, cymene ($C_{20}\ H_{14}$) and cumyle ($C_{20}\ H_{12}\ O_2$), which becomes oxidated by exposure, and converted into cuminic acid ($C_{20}\ H_{11}\ O_3$).

Medical properties and uses. — Cumin seeds are carminative and stomachic; but they are chiefly employed as an external stimulant in discussing indolent tumours.

Officinal preparation.—*Emplastrum Cumini,* L.

CUPRUM. *Lond.* (*Appendix*). Copper.

Syn. Cuivre (*F.*), Kupfer (*G.*), Koper (*Belg.*), Kobber (*Dan.*), Koppar (*S.*), Rame (*I.*), Cobre (*Swed.*), Miedz (*Pol.*), Mjed (*Russ.*), Shemboo (*Tam.*), Tambaga (*Malay*), Nehass (*Arab.*), Tamba (*Duk. H.*), Tamra (*San.*), Ka-nōō-yak (*Esquimaux*).

Copper is a metal of a reddish colour, found very abundantly in many countries in both hemispheres of the globe. [1] It is procured—

A. In its metallic state:

i. Crystallized,	(*Alloy*) Sp.	1. *Native copper.*
ii. Sulphureted.	————	2. *Vitreous copper* (*common sulphuret*).

[1] The richest copper mines are those of Cornwall in England, the Pyrenees, and of Fahlan in Sweden. Some copper is found in the Ural. Devergie has asserted that copper is a constituent of animal bodies, man not excepted. *Journ. de Chim. Méd.* t. iv. 1838.

a. and combined with iron.	3. *Purple copper.*
———	4. *Grey copper.*
———	5. *Copper pyrites.*
———	6. *Black copper.*
b. ——— with iron and arsenic.	7. *White copper.*
B. United with oxygen:	
iii. Oxidized. ———	8. *Ruby copper.*
———	9. *Tile-red copper.*
———	10. *Black copper.*
c. and combined with carbonic acid. ———	11. *Azure copper, or Mountain blue.*
———	12. *Malachite.*
———	13. *Emerald copper.*
d. ——— with arsenic acid. ———	14. *Octahedral arseniate of copper.*
———	15. *Hexahedral arseniate of copper.*
———	16. *Prismatic arseniate of copper.*
———	17. *Trihedral arseniate of copper.*
———	18. *Martial arseniate of copper.*
e. and combined with phosphoric acid.	19. *Phosphate of copper.*
f. ——— with hydrochloric acid.	20. *Sandy copper.*[1]

The sulphurets are the most abundant ores, and those from which copper is usually extracted. They are found in many parts of the world, in Europe, America, Africa, Nipal, and many parts in Asia. In Britain these are procured chiefly in Cornwall[2], whence they are carried to Wales to be smelted. The ore is first roasted to volatilize the sulphur and arsenic, which escape partly as sulphurous acid and arsenious acid, partly as simple sulphur, which is collected in chambers connected by flues with the kilns. The metal thus procured is smelted in contact with fuel, in a large reverberatory furnace, with the addition of sand to separate the iron; which, being less fusible than the copper, remains in the scoria as an oxide, while the melted copper is drawn off through a plug-hole into earthen moulds. The copper, however, in this state, is still very impure; and therefore it is re-smelted and granulated; and lastly, refined by being again smelted with the addition of a little charcoal, which brings it to a state fit to bear the hammer, and to answer the various purposes of art.

Pure copper has a brilliant yellowish-red colour; is sonorous, ductile, malleable, tenacious; has a styptic, disagreeable taste, and emits an unpleasant odour when rubbed: its point of fusion is

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[1] Vide *Aikin's Chemical Dictionary*, art. *Copper.*

[2] The Parys mine in the Isle of Anglesea is now nearly exhausted. The Harz mines yield annually fifty tons of copper.

1996 Fahr.: at a higher temperature it is volatilized. The specific gravity, when it is pure, and has been only fused is 8·667. It has a granulated texture, and breaks with a hackly fracture; and crystallizes in cubes and octohedra. It is oxidized, when heated in contact with atmospherical air, even at a temperature below that of ignition. It is capable of receiving a brilliant lustre by polishing. It remains unchanged in dry air; but when exposed to humidity and to air at the same time, it is tarnished, and a green crust is formed on its surface, which is a carbonate of the black oxide of copper. Copper is oxidized by nitric acid, and the oxide dissolves in the acid, forming a bluish-green solution. The equivalent of copper is 31·66.

Although copper in its metallic state was used as a remedy by the ancients, yet it is completely discarded from modern practice: and notwithstanding so much has been said of its deleterious effects, there is every reason for believing that clean copper, when taken into the stomach, exerts no action whatever on the system. Two cases of halfpence being swallowed by children have come under my observation, in one of which the copper coin remained six months in the intestines, and in the other it remained two months. Both coins were evacuated without having in the smallest degree injured the health, although the impressions on them were nearly effaced, and the metal was much corroded.[1] Smelters and workers in copper, also, suffer no inconvenience. But poisoning from the use of copper utensils in cookery arises either from the formation of the green carbonate, mentioned above, owing to the vessels not being well cleaned, and the food being allowed to stand for some time in the pan exposed to the air, after it is taken from the fire; or from the formation of verdigris, when vinegar, used in making pickles, and other acid liquors intended for internal use, are boiled in brass or copper vessels. The salts of copper thus formed are poisons, exciting inflammation of the stomach; and many fatal accidents have arisen from the carelessness which produces them in cooking utensils, and from the equally dangerous mode of giving a fine green colour to vegetables by boiling halfpence with them; on which account copper utensils should be altogether banished from the kitchen and also from the laboratory, where they are sometimes employed in making decoctions.

The salts of copper may be detected in any suspected liquor, by boiling first with dilute acetic acid and filtering: which separates the copper from all vegetable or animal matter; then passing through the solution a stream of sulphureted hydrogen gas, collecting the precipitate, drying it, incinerating it in a glass tube, and

[1] M. Drouard administered finely-powdered metallic copper, in doses of an ounce, to dogs, without perceiving any inconvenience to result from it. *Exp. et Obs. sur l'Empoison par l'Oxide de Cuivre.*

converting the sulphuret into the sulphate by the addition of a few drops of nitric acid. The copper may be now rendered obvious, by diluting the solution of the sulphate, and placing in it either a piece of clean polished iron wire, on which the copper is precipitated in a metallic state; or by dropping into the solution an excess of ammonia, which produces a beautiful blue colour, if any salt of copper be present; or by adding a drop or two of a solution of the ferrocyanide of potassium, which throws down a chocolate-coloured precipitate, forming one of the most delicate of the tests for the salts of copper. In cases of poisoning by any of the salts of copper, albumen is the best antidote. Iron filings, which precipitate the copper in the metallic state, have been recommended by Navier and several others. The ferrocyanide of potassium has been employed, and also sugar; but none of these have been found so serviceable as the white of eggs.

The oxides of copper unite with acids, and form salts which act very powerfully on the animal system; but of these the *acetates* and the *sulphate* with the *ammonio-sulphate,* only are admitted into the list of Materia Medica.

1. DIACETATE OF COPPER.

Officinal. ÆRUGO, *Lond. Edin. Dub.* Verdigris, or commercial Diacetate or Subacetate of Copper.

Syn. Vert de gris (*F.*), Grunspan crystalle (*G.*), Verdegrise (*I.*), Cardenillo (*S.*), Vungala patchei (*Tam*), Zungar (*Pers. Duk.*), Sennang (*Malay*), Zunjar (*Arab.*), Pitrai (*H.*), Pitalata. (*San.*).

This salt, which is an acetate, is principally manufactured in the south of France, at Montpellier, and Grenoble.[1] In the former place, the *marc* of the grape, that is, the cake which remains in the wine-press after the juice is expressed, composed of the husks and stalks, is moistened with water, or with wine if poor, and disposed so as to excite in it the acetous fermentation. When this takes place it is put into jars between well hammered plates of copper, about 1-24th of an inch in thickness, five inches long, and three broad: these are strongly heated over a pan of burning charcoal, the layers of fermented marc being between the plates of copper. The jars, each of which contains about 40 lbs. of copper[2], besides marc, are then loosely stopped with straw, and left at rest for ten, fifteen, or twenty days; at the end of which time the marc begins to whiten and the copper is found to be covered with a green crust, interspersed with distinct silky, green crystals. This is termed cottoning the copper. The plates are then moistened with water, and set up in racks, face to face, in a

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[1] Vide Chaptal's Account of the Manufacture, *Phil. Mag.* vol. iv. p. 71.

[2] Forty pounds of copper yield about five or six pounds of rough verdigris.

cellar: and this watering is repeated once in seven days for six or eight times, until a thick coat of verdigris is formed, which is scraped off; and the copper plates again subjected to the same process, until they are completely corroded. When the plates are first used, the verdigris is apt to be black, unless their surfaces be previously rubbed with a solution of verdigris, which is suffered to dry before they are used.

Verdigris in this rough state is sold by the makers, who are generally women belonging to the wine farms about Montpellier, to commissioners, by whom it is further prepared. After being well beaten in wooden mortars, it is pressed down in bags of white leather, a foot in depth and ten inches wide, in which it is dried in the sun; and thus a loaf of verdigris is formed, which cannot be pierced with a knife.

In this process, the copper is oxidized, and the oxide combined with acetic acid, forming a diacetate, which is mixed with vegetable extractive matter, and the stalks and husks of grapes. The Grenoble verdigris is purer than the Montpellier, being prepared by simply disposing plates of copper in a proper situation, and repeatedly moistening them with distilled vinegar until the surface be oxidized, and changed into verdigris.

The diacetate of copper is imported into this country in the leathern sacks, or bags, in which it is dried, each containing from fourteen to thirty pounds' weight. But it is also now prepared in Great Britain.

Qualities. — Good diacetate of copper is inodorous. It seems at first nearly insipid, although exceedingly styptic; and it leaves a strong metallic taste in the mouth. The mass is dry, not deliquescent, of a hard, pulverulent, foliaceous texture, and a beautiful bluish-green colour. Distilled water at 60° dissolves 0·56 parts, while 0·44 remain in the state of a fine green powder, long suspended in the solution; that part which is dissolved is an acetate of copper: the filtered solution reddens litmus paper; the insoluble powder is a tris-acetate, mixed with impurities. The composition of verdigris is usually that of a diacetate, having a formula $2\,Cu\,O, C_4\,H_3\,O_3 + H\,O$. When boiling water is used, the insoluble part is of a brown colour. Sulphureted hydrogen gas decomposes the solution, precipitating a black sulphuret of copper. A small cylinder of phosphorus put into the solution is rapidly covered with a coat of metallic copper. The solution is precipitated by ferrocyanide of potassium.

Besides the stalks and husks of grapes, verdigris is often adulterated with sand, and other earths. These are discovered by dissolving it in diluted sulphuric acid, which takes up the whole of the salt, and leaves the impurities; or by boiling it in twelve or thirteen times its weight of distilled vinegar, allowing the undissolved part to settle, and ascertaining its amount. The addition of

chloride of barium to the acetic solution will detect any admixture of the sulphate or the tartrate of copper.

Medical properties and uses.—Verdigris is a tonic to the nervous system, emetic, astringent, and antispasmodic. It has been used in epilepsy; and extolled as an emetic in cases which require that the stomach should be quickly evacuated, without weakening it, as in incipient phthisis; but its internal exhibition is always dangerous, and to be avoided. It is, however, a useful detergent and escharotic application to foul ulcers, and the callous edges of sores, and to consume fungus; but it is seldom used, although it is milder than the sulphate of copper. It is also employed as a collyrium in chronic ophthalmia.[1]

The dose of verdigris, to produce its tonic effect on the nervous system, is under gr. ss.; that which is necessary to operate as an emetic, from gr. j. to grs. ij. In overdoses it quickly proves fatal, acting both locally and on the nervous system; the symptoms are colic pains, profuse vomiting and purging, sometimes salivation; convulsions, palsy, and fatal coma. On dissection, the coats of the stomach appear much thickened from inflammation; there is ulceration of the mucous membrane of the intestines, sometimes gangrene, and the whole is of a green colour. We formerly suggested the idea that fine filings of iron might precipitate the copper in its metallic state, and operate as an antidote, and that the experiments of Duval and others had proved that sugar is the antidote of cuprous poisons[2]; but our own experience since does not authorise an acquiescence in the suggestion; and sugar reduces the salts of copper only by ebullition. The best antidotes yet suggested are albumen and the ferrocyanide of potassium.

Officinal preparations. — *Cupri Subacetas præparatum*, D. *Unguentum Æruginis*, E. *Linimentum Æruginis*, L.

2. ACETATE OF COPPER.

CUPRI ACETATIS CRYSTALLI. Crystals of Acetate of Copper. Formerly officinal in Dublin Pharmacopœia.

Syn. Verdet crystallisé, Cristaux de Venus (*F.*), Destillirten Grunspan (*G.*).

This salt is manufactured both in France and Holland. It is easily obtained by dissolving 100 parts of verdigris in 200 parts of distilled vinegar heated to boiling. When the solution is completed, it is poured off clear from any undissolved matter, and evaporated until ready for crystallization. The crystals are generally formed upon sticks, in conical masses. About three pounds of verdigris are required to make one pound of crystals.

[1] Dr. Paris (*Pharmacologia*) says, that it is the active ingredient in *Smellome's Eye Salve*, a nostrum at one time in much repute.

[2] Vide *Traité des Poisons*, &c. par P. M. Orfila, tome i. p. 289.

Qualities. — Crystallized acetate of copper has a deep green colour: the crystals are semi-translucent octahedrons, with a rhomboidal base. The taste is acrid. Exposed to the air, acetate of copper effloresces; and when heated is decomposed, giving off gaseous or anhydrous acetic acid, the metal reduced mixed with charcoal being left in the retort. It is soluble in 20 parts of cold water, in 5 of boiling water, and crystallizes on cooling; and in 14 of alcohol. Acetate of copper has the formula $Cu\,O, C_4\,H_3\,O_3 + HO$.

Medical properties and uses. — This salt possesses the same properties, and is used for the same purposes, as rough verdigris. The solution is precipitated of a bluish white colour by albumen if not added in excess; when in excess the precipitate is dissolved.

3. SULPHATE OF COPPER.

Officinal. CUPRI SULPHAS VENALIS, *Lond.* CUPRI SULPHAS, *Edin. Dub.* Commercial Sulphate of Copper. Sulphate of Copper.

Syn. Sulfate de cuivre (*F.*), Schwefelsaures Kupferoxyd, Kupfervitriol (*G.*), Koper rood (*Dutch*), Blu vitriol (*Swed.*), Sernokislæia okis medi (*Russ.*). Kopper vitriol (*Belg.*), Blaau vitriol (*Dan.*), Vitriuolo Turchino, Sulfato di rame (*I.*), Caparosa, vitriolo azul (*S.*), Vitriolo de Cobre (*Port.*), Zungbar (*Arab.*), Tuteya (*H.*), Tutt'ha (*San.*), Toorishoo (*Tam.*), Neelatota (*Duk.*), Palmanicum (*Cing.*).

A considerable part of this salt, which is the blue vitriol of commerce, is obtained by evaporation from the water of some copper mines. Its origin is derived from the natural sulphurets of copper, which, suffering a chemical change from exposure to a moist atmosphere, are converted in the sulphate, and washed down by the rain and other water of the mines.[1] It is also obtained by roasting copper pyrites, and exposing it to the action of air and moisture; in which case, as well as in the former, the compound is oxidized by attracting the oxygen of the surrounding atmosphere, at the same time that it changes the sulphur into sulphuric acid: so that by the gradual combination of these the sulphate is produced: it is then extracted by solution, and crystallized. It is also, in France, made by sprinkling wet sheets of copper with sulphur, then heating them to redness, and plunging them in water. The surfaces of the sheets are thus covered with the sulphuret, which, on exposure to the air, gradually passes into the sulphate, which is dissolved and crystallized. It is further procured in the process of freeing silver of the gold which it sometimes contains. The silver is first melted, then granulated and boiled in sulphuric acid, which unites with both the silver and the copper, and leaves the gold. The sulphate of silver is decomposed by the immersion of plates of copper in the

[1] From this water at the Parys mine, a large supply of copper is obtained, by decomposing the sulphate, by throwing into the water old iron hoops.

solution, which throws down the silver and leaves sulphate of copper.[1]

Qualities. — Sulphate of copper is inodorous, and has a very harsh, acrid, styptic taste. It always reddens vegetable blues. It is in semitransparent crystals, which undergo a slight degree of efflorescence when exposed to the air: their form is that of the doubly oblique prism; and their colour a deep rich blue. Its specific gravity is 2·1943.

Sulphate of copper is soluble in four parts of water at 60°, and less than two at 212°. It is insoluble in alcohol. The solution reddens litmus paper. Its formula is $Cu\,O, S\,O_3 + 5\ H\,O$. It is decomposed by the alkalies and alkaline carbonates, the biborate and phosphate of soda, acetate of ammonia, the acetate and subacetate of lead, and acetate of iron, nitrate of silver, bichloride of mercury, tartrate of potassa, chloride of calcium; and is precipitated by the astringent vegetable infusions and tinctures; all of which are therefore incompatible in prescriptions with sulphate of copper. If an excess of ammonia throw down a precipitate, and does not re-dissolve it, an oxide of iron is present.

Medical properties and uses. — Sulphate of copper is emetic, astringent, and tonic, when taken internally. With a view to its emetic effect, it has been given in the early stage of phthisis, in croup[2], and where laudanum has been taken as a poison; and as an astringent and tonic, in chronic diarrhœa, alvine hæmorrhages, intermittent fever, epilepsy, and some other spasmodic affections; but its internal use should be carefully watched. Its property of exciting vomiting has led to its employment in croup. Dr. Dreyer orders one sixth of a grain to be given every ten minutes until repeated vomiting is induced; and then to continue one quarter every half-hour until vomiting is again induced.[3] Externally it may be employed to give a healthy stimulus to indolent foul ulcers, in which I have found it extremely beneficial; and as an escharotic, to consume fungus. Pledgets dipped in a weak solution of it are, also, sometimes used as a styptic in epistaxis, and other approachable hæmorrhages; and a still weaker solution is a useful collyrium in some kinds of ophthalmia. In chronic inflammation of the eyelids, everting them, and rubbing them with the salt and immediately afterwards pressing upon them a sponge dipped in cold water, rarely fails to cure the disease. It forms the basis of a very unchemical preparation, Bate's *aqua camphorata*[4], which the

[1] *Pereira's Elements.*

[2] Drs. Serle and Malin used it with success. Vide *Hufeland's Journ.* Jan. 1834.

[3] *Neue Zeitschr. f. Geburtshunde.* 13 Band. 1 Heft.

[4] The following is the formula for Bate's preparation: — ℞ *Cupri sulph. Boli Gall. aa.* grs. xv. *Camphoræ,* grs. iv. *Solve in aq. ferv.* f℥ iv., *dilueque cum aq. frig.* O iv. *ut fiat Collyrium.*

late Mr. Ware recommended, diluted with sixteen parts of water, in the purulent ophthalmia of infants.

As an emetic, the dose is from grs. iij. to xv., in f ℥ ij. of water; but as a tonic it should be given in the form of pill, beginning with gr. $\frac{1}{6}$, and gradually increasing the dose to grs. ij.

Officinal preparation.—*Cupri Sulphas,* L.

CURCUMA. *Roscoe, Linn. Trans.* vii. 354.

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. ord.* Zingiberaceæ.
Gen. Char. Anther double, two-spurred. *Filament* petal-like, three-lobed, bearing the anther in the middle.
Sp. 1. C. *longa.*[1] *Spec. Plant. Willd.* 1. 7. *Hort. Malabar.* xi. 11.
Officinal. CURCUMA. *Lond.* (Appendix), *Edin.* Rhizome of Curcuma longa. Turmeric.

Syn. Racine de Curcuma (*F.*), Kurkuma Gelb-wurzel (*G.*), Curcuma (*I.*), Zirsood (*Arab.*), Zirdehoobeli (*Pers.*), Gurkmeje (*Swed.*), Gurkemeje (*Dan.*).

This plant is a perennial, a native of the East Indies, growing in sandy open places in Ceylon and Malabar, where it flowers in April and May. The root bears oblong tubers, which are palmate, and of a deep orange colour inside. The leaves are long, lanceolate, stalked, smooth, and uniformly green.[2] The scape, which rises from among the leaves, is naked, and terminated by a lax, cylindrical, truncated, lateral spike of flowers.

The best tubers come from Ceylon, in firm, short, wrinkled pieces, of an ash-colour externally, and internally of a deep orange yellow. They should be heavy, and not worm-eaten.

Qualities.—The odour of curcuma is fragrant, and somewhat like that of camphor; the taste aromatic and bitterish, with some degree of acrimony, approaching to, but less than that of ginger. The tubers break with a short close fracture, are pulverulent, and internally of a brownish red colour. The active and colouring principles are partially extracted by water, and more completely by alcohol, ether, and oil. In distillation with water, a heavy, greenish essential oil is obtained, which deposits camphor. According to the analysis of John, curcuma yields *volatile oil* 1 part, *yellow resin* (*Curcumin*) 11 parts, *yellow extractive* 11, *gum* 14, *ligneous fibre,* mixed with a substance insoluble in alcohol but soluble in potassa, 57, and *water* 6, = 100 parts. It seems to contain, independent of its aromatic and bitter principles, a large proportion of fecula, and a colouring principle called *Curcumin,* which is extracted by alcohol, has a resinous aspect, and, when it is reduced to powder, a bright yellow colour.[3] From the action of the alkalies on this

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[1] The excellent reasons given by Mr. Roscoe for separating this plant from the genus *Amomum,* induce me to prefer his authority to that of Wildenow in this instance.

[2] Roxburgh; vide *Asiatic Researches,* vol. xi. p. 165.

[3] Curcumin is procured by digesting the alcoholic extract of curcuma in ether, and

colouring principle, turning it to red-brown, curcuma is a good test of the presence of these bodies: and owing to the curcumin, its spirituous solution precipitates acetate of lead, nitrate of silver, sulphate of copper, and sesquichloride of iron. *Turmeric* is placed in the Appendix of the London Pharmacopœia for testing the presence of alkalies; for which purpose a paper is prepared by brushing the tincture or decoction of the rhizome over the surface of unsized paper, and then allowing it to dry. Besides the alkalies, some other bodies, as boracic, strong sulphuric, and the vapour of hydrochloric acids turn the colour of the turmeric brown.

Medical properties and uses.—Curcuma is tonic and carminative. It was much employed by Avicenna, and other Arabians, in vomitings, colics, lientery, difficult menstruation, and as an antidote for venomous bites. It is certainly an agreeable stomachic, and useful in flatulent colic; but it is scarcely ever used by modern practitioners. The dose of the powdered tuber may be from grs. viij. to ℨ ss., two or three times a day. It forms an ingredient of curry powder.

CUSPARIA. See *Galipea Cusparia.*

CYCAS CIRCINALIS. See *Sagus.*

CYDONIA. *Spec. Plant. Willd.* ii. 1012.

Cl. 12. *Ord.* 1. Icosandria Pentagynia. *Nat. ord.* Rosaceæ. *Sub. ord.* Pomaceæ.

G. 992. *Calyx* five-cleft. *Petals* five. *Pome* inferior, five-celled, many-seeded.

Species 17. C. *vulgaris.* The Quince tree. *Med. Bot. 3d edit.* 505. *t.* 182. *Hayne*, iv. 47.

Officinal. CYDONIUM, *Lond.* Quince seed.

Syn. Coing Semen de Coignassier (*F.*), Quittenkörne (*G.*), Kwee (*Dutch*), Quaeden (*Dan.*), Quitten (*Swed.*), Pigwa (*Pol.*), Semi de Cotogno (*I.*), Simiente de Membrillo (*S.*), Marmelo (*Port.*), Hubalsufirjul (*Arab.*), Beheckey beej (*H.*), Béhdānā (*Tam.*), Bedana (*Pers.*).

The quince tree was originally brought from Cydon[1] in Crete by the Greeks; but it has been found growing wild in Germany and on the rocky shores of the Danube, and is cultivated to great perfection in England, and many other parts of Europe; flowering in May. It is a low, crooked tree, with many spreading branches, covered with a brown bark. The leaves are ovate, very entire, about 2½ inches long, and 1½ inch broad, of a dusky green colour

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evaporating the etherial solution to dryness. It is brownish in mass, yellow in powder; tasteless, inodorous, insoluble in water; soluble in alcohol and in alkalies, which deepen its red-brown colour.

[1] Whence its Greek name μηλεα Κυδωνια (Theophrasti) is derived. It is supposed to be the apple of the Hesperides.

on the upper surface, paler and downy beneath: the flowers are large and solitary: the calyx, which is of the length of the corolla, is spreading, serrated, persistent, and villous: the petals rose-coloured or white, concave, roundish, and inserted into the calyx: the filaments are erect, awl-shaped, purplish, and support yellow anthers: the fruit is a *pome.* Its magnitude and shape are those of a moderate-sized pear.[1] It is of a yellow colour, downy, umbilicated; and, when ripe, has a pleasant odour, and a very austere, acidulous taste[2]: each of its cells contains from eight to fourteen seeds, ovate, angled, reddish-brown, flat on one side, convex on the other, coriaceous, and placed erect in pairs.

Qualities.—The seeds are inodorous, and nearly insipid, having a slight bitterness only when long chewed. The exterior coat contains a considerable quantity of mucus, which is readily extracted by hot water; but it is not pure mucus, being mixed with fecula, and other soluble parts of the seeds, and also with malic acid. It is also probable that the seeds contain amygdalin, as hydrocyanic acid may be procured from them by distillation.[3]

Officinal preparation.—*Decoctum Cydonii,* L.

CYMINUM. See *Cuminum.*

CYTISUS.[4] *Spect. Plant. Willd.* iii. 926.

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.
G. 1332. *Stigma* longitudinal, villous above. *Filaments* adhering to the germen. *Calyx* produced downwards.
** *With ternate leaves.*
Species. C. *Scoparius.* Common Broom. Spartium *Scoparium Med. Bot. 3d. edit.* 413. *t.* 150. *Smith, Flora Brit.* iii. 753. *De Candolle. Hayne,* ix. 10.
Officinal. SCOPARIUS, *Lond.* SCOPARIUM, *Edin.* CYTISUS SCOPARIUS, *Dub.* The recent and dried tops of Broom.

Syn. Genet à balai (*F.*), Pfriemenkraut (*G.*), Bezembren (*Dutch*), Gyfvel (*Dan.*), Pingsblomma (*Swed.*), Ginestra (*I.*), Esparto (*S.*), Giesta (*Port.*), Drok (*Russ.*).

This is an indigenous shrub, growing on dry common pastures; flowering in May and June. It usually rises from four to six feet in height, and sends off numerous, straight, angled, green, smooth,

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[1] The quince tree varies in the form of its fruit, which is sometimes globular, sometimes oblong, but more generally pyriform; and, also, in the magnitude of its leaves.

[2] Although the fruit of the quince is not good in its raw state, yet it affords an elegant sweetmeat, called quince marmalade, *mira cydonarium;* and from the expressed juice an excellent and wholesome wine is prepared.

[3] Dr. Pereira terms the mucus of quince seeds, *Cydonin;* and considers it distinguishable from *arabin* by not being affected by silicate of potassa; from *bassorin* by its solubility in water; and from *tragacanthin* by its bearing with sulphate of iron, oxalate of ammonia, and alcohol. *Elements of Mat. Med.*

[4] Σπαρτιον Dioscoridis.

leafy branches: the leaves are ternate, small, and smooth; the upper ones, however, are frequently simple. The flowers are papilionaceous, axillary, solitary, peduncled, nodding, large, and showy; of a golden colour; sometimes tawny on the outside, and occasionally altogether of a lemon hue: the calyx is nearly bell-shaped, bilabiate, gaping, even, and purplish, with a five-toothed lip: the stamens are all united into a tube at the base, and bear oblong saffron-coloured anthers: the germen is villous: the style bent almost to a circle: and the legume compressed, brown, ciliated, and containing several compressed shining seeds.

Qualities.—The tops, when bruised, have a disagreeable odour, and a nauseous bitter taste. The flowers have been examined.[1] Both water and alcohol extract the active matter of the tops. Dr. Stenhouse, who has recently examined the Cytisus Scoparius, finds that the extract, by the action of nitric acid, yields oxalic and nitro-picric acids, the latter having the composition $C_{12}\,H_2\,N_3\,O_{13} + H\,O$; also, that in the decoction of the plant a principle called *Scoparine* exists, which, when pure, occurs in pale yellow prisms, of a feeble acid character, soluble in spirit and hot water, its formula being $C_{21}\,H_{11}\,O_{10}$.

The mother liquor, from which the scoparine had been separated when concentrated, treated with excess of soda, and distilled, yields a colourless oil, possessing strong basic characters, named *Sparteine*, soluble in alcohol and ether, boiling at 550° F, neutralizing acids, and forming bitter salts: some of these, as the nitrate, sulphate, and hydrochlorate, are very soluble and difficult to crystallize; the double salts, with chlorides of platinum and mercury and the nitro-picrate readily crystallizing. Formula of sparteine, $C_{15}\,H_{13}\,N.$; of the double platinum salt, $C_{15}\,H_{13}\,N\,H,\,Cl. + Pt\,Cl_2 + 2\,H\,O.$; of the nitropicrate, $C_{15}\,H_{13}\,N,\,H\,O + C_{12}\,H_2\,N_3\,O_{13}$.

Medical properties and uses.—Broom-tops are diuretic and cathartic: the seeds are said to be emetic. The effects of this plant have been very long known to the common people; and both Mead and Cullen found them useful in dropsy. The usual mode of exhibiting them is in the form of decoction, made by boiling half an ounce of the green tops in a pint of water down to half a pint. Cullen, speaking of this decoction, of which two table-spoonsful were given every hour till it operated by stool, says[2], "It seldom fails to operate both by stool and urine; and by repeated exhibition, every day, or every second day, some dropsies have been cured."[3] My own experience accords with that of Cullen; but it is useful only in cases in which no inflammatory diathesis

[1] Cadet de Gassicourt found in them a *concrete volatile oil, fatty matter, wax, yellow colouring matter, chlorophylle, tannic acid, a saccharine principle, mucilage, ozmazome, albumen, and lignin.* — *Journ. de Pharm.* x. 418.

[2] *Mat. Med.* ii. 534.

[3] *Ibid.*

exists. Sydenham used the ashes, which contain carbonate of potassa, chloride of potassium and of calcium, sulphate of potassa, and some other salts.[1] These were at one time supposed to be the diuretic principles. It has, however, been recently asserted, that the *Sparteine*, above described, is a narcotic principle, and that the *Scoparine* possesses all the diuretic properties of the plant.

Officinal preparations.—*Decoctum Scoparii compositum*, L. *Decoctum Scoparii*, E. D.

DAPHNE.[2] *Spec. Plant. Willd.* ii. 415.

Cl. 8. *Ord.* 1. Octandria Monogynia. *Nat. ord.* Thymelaceæ.
G. 773. *Calyx* none. *Corolla* four cleft, corollaceous, withering, enclosing the stamens. *Drupe* one-seeded.
* *Flowers lateral.*
Species 1. D. *Mezereum.* Common Mezereon. *Med. Bot.* iv. 716. *t.* 68. *Smith, Flor. Brit.* 420. *Hayne*, iii. 43.
Officinal. MEZEREUM, *Lond. Edin. Dub.* The bark of the root of the Daphne Mezereon.

Syn. Laureole gentil, Garou (*F.*), Seidelbart, Kellerkals (*G.*), Peperbomje (*Dutch*), Kielderhals (*Dan.*), Tibast (*Swed.*), Wylcze lyko (*Pol.*), Biendella, Mezereo (*I.*), Mezereou (*S.*), Mezereao (*Port.*), Boltschink, Sagolki voltschi (*Russ.*).

Mezereon grows, although probably not a native, yet wild in England, and the north of Europe; but for medical use, and as an ornamental shrub, it is cultivated in gardens. Its flowers expand in March, before the leaves. It is a hardy plant, seldom exceeding four feet in height, with a strong woody branching stem, covered with a smooth, grey cuticle, and a tough fibrous inner bark. The root is of a fibrous texture, pale-coloured, with a smooth olive-coloured bark: the leaves, which are protruded from the extremities of the branches, are tender, pale green, deciduous, lanceolate, sessile, entire, and smooth: the flowers are of a pale rose-colour, odorous, surrounding the twigs in clusters below where the leaves are sent off; they are sessile, two, three, and four clustered, with deciduous bracts at the base of each cluster; monopetalous, tubular, and the lip divided into four ovate spreading segments; the stamens are alternately shorter; the four higher ones displaying their yellow anthers at the mouth of the tube: the germen is oval, supporting a flattish stigma on a very short style; and the fruit is a red pulpy berry, containing one round seed. There is a variety of the mezereon with white flowers and yellow fruit, but the medicinal effects of both are the same.[3]

For medical use, the roots are dug up in the autumn, after the leaves have fallen. The cuticle of the dried root is corrugated

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[1] *Tract. de Hydrope*, Opera, 466.
[2] Δαφνη Theophrasti et Dioscoridis.
[3] In France, Daphne *Gnidium*, D. *alpina*, D. *Cneorum*, and in Germany, D. *Laureola*, are used indiscriminately with D. *Mezereum.*

and tough, and the inner bark has a white cotton-like appearance, is pliable and fibrous. It is imported chiefly from Germany.

Qualities.—The inner bark of every part of this plant, when fresh, is tough, pliable, and fibrous: it is very acrid, capable of producing inflammation, vesication, and a discharge of serum when applied to the skin; and when chewed, it first impresses a sweetish taste, and then excites a considerable heat of the mouth and fauces, which continues for many hours afterwards. The fruit is equally acrid, acting as a corrosive poison, if eaten. The bark retains its acrimony when dried. It yields its virtues to water and vinegar. According to Gmelin, it contains *Daphnin, wax, acrid resin, volatile oil, yellow colouring matter, uncrystallizable sugar, nitrogenous gummy matter, reddish brown extractive, free malic acid, malates of potassa, lime, magnesia,* and *lignin.*[1] Daphnin is procured in prisms united in bundles, transparent and shining; it dissolves readily in hot water, and crystallizes again as the solution cools; it is also soluble in alcohol and ether. Gmelin regards it analogous to asparagin. Nitric acid converts it into oxalic acid. It is certainly not the active principle of the bark. Gmelin and Bar have separated from mezereon an acrid resin of a dark green colour, slightly soluble in water, and possessing a vesicating property. The volatile principle which passes over when mezereon bark is boiled in water is exceedingly acrid.

Medical properties and uses.—Mezereon operates as a stimulating diaphoretic, increasing the general arterial action, and determining powerfully to the surface; but is apt to disorder the primæ viæ, and occasion vomiting and purging. It was long externally employed as a stimulant to ill-conditioned ulcers; and the recent bark, macerated in vinegar and applied to the skin, is recommended in France for producing and keeping up a serous discharge in chronic local affections. To form the issue, the bark must be renewed every night and morning; and afterwards once in twenty-four hours, to keep open the drain.[2] Dr. Withering employed it successfully as a local stimulant in a case of difficulty of swallowing occasioned by paralysis of the tongue. Although the case was of three years' standing, the patient recovered the power of swallowing in about a month, by very frequently chewing thin slices of the root. For this purpose it should be sliced longitudinally, as the acrimony resides in the bark only, the woody fibre being nearly inert. Internally, a decoction of this bark has been used against chronic rheumatism, scrofulous swellings, lepra, and some other cutaneous diseases; and, till lately, it was considered an antivene-

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[1] *Gmelin, Handb. d. Chim. Bat.* ii. § 1317.

[2] The following ointment is admirably adapted for maintaining a discharge from blistered surfaces:—"Take of *alcoholic extract of Mezereon* ℈ iv., *alcohol* f ʒ v., dissolve and add ℥ ix. of *lard*, and ʒ x. of *white wax;* mix to form an ointment."

real remedy of great efficacy, when given in conjunction with sarsaparilla, in the Lisbon diet drink. The dose in substance is gr. j. to grs. x. It is scarcely ever prescribed in this form. It is contained in the *Decoctum Sarsaparillæ comp.*

DATURA. *Spec. Plant. Willd.* i. 1007.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.

G. 337. *Corolla* funnel-shaped, plaited. *Calyx* tubular, angled; deciduous. *Capsule* with four valves.

Species 2. D. *Stramonium.* Thorn apple. *Med. Bot. 3d edit.* 197. *t.* 74. *Smith, Flor. Brit.* 253. *Biglow, Amer. Med. Bot.* i. 17. *Hayne,* iv. 7.

Officinal. STRAMONII FOLIUM ET SEMEN, *Lond.* STRAMONIUM, *Edin.* STRAMONIUM; the seeds, *Dub.* The herbaceous part and the seeds of the Thorn-apple plant.

Syn. Pomme Epineuse (*F.*), Gemeine Stechapfel (*G.*), Doorn-appel (*Dutch.*), Piigaeble Galuvt (*Dan.*), Spikklubert (*Swed.*), Jondera (*Pol.*), Stramonio (*I.*), Estramonio (*S.* & *Port.*), Diarman, Pianie Ogurtizi (*Russ.*), Karoo Oomatie (*Tam.*), Dhétoora (*H.*), Jeuz massel (*Arab.*), Goozgneah (*Pers.*), Rotecubung (*Malay*), Kala D'hatoora (*Beng.*), Kaloo Attana (*Cyng.*), Krishna Dhaturra (*Sans.*).

This annual plant is a native of America, but is now naturalized to this country, and is found growing on dunghills and by roadsides[2], from the fruit ejected from gardens; flowering in July and August. It rises about two feet in height, with a round stem, branching and dichotomous above; spreading and leafy. The leaves, which spring from the forks of the stem on long round petioles, are large, of a dull green on the upper surface, and pale beneath; irregularly ovate in figure, acutely sinuated, and unequal at the base: the flowers are large, axillary, and solitary, on short erect pedicels: the calyx is tubular, pentangular, and five-toothed: the corolla long, of a white colour, funnel-shaped, and plaited: with the filaments, which support oblong flat anthers, adhering to the tube; and the style filiform, terminated with a thick club-shaped stigma. When the corolla and its included parts drop, the calyx also separates, except the base, which remains, and, becoming reflex, enlarges with the receptacle as a support to the fruit. The fruit is a large, fleshy, ovate-roundish, four-cornered capsule, beset with prickles, four-celled at the base, two-celled at the apex, and containing a great number of reniform, compressed seeds. The flowers are sweet-scented at night. The leaves, capsule, and seeds are medicinally used.[3] They should be collected when the herb is in flower.

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[1] These oriental synonymes, although inserted under this species, yet are those of D. *fastuosa.*

[2] Very common about London.

[3] According to Dr. W. Ainslie, this species of Datura is not found in India; but the D. *fastuosa,* Dhétoora (*Hind.*), Dhaturra (*Sans.*), Kkassian (*Jav.*), is well known and medicinally used. — *Mat. Med. of Hindostan,* 4to. p. 42.

Qualities.—The whole herb has a narcotic fœtid odour, producing headach; a bitterish nauseous taste, and gives to the saliva a deep green tinge when chewed. The analysis of Promnitz gives, as the components of thorn apple, *gummy extractive* 0·58, *extractive* 0·60, *chlorophylle* 0·64, *albumen* 0·15, *resin* 0·12, and *phosphate of lime* and *magnesia* 0·23, *water* 91·25, *lignin* and *loss* 6·43: =100·00.[1] Brandes found in the seeds of Datura strammonium a principle which he named *Daturia*, the chemical characters of which have been examined by Geiger and Hesse.

Daturia occurs, when pure, in transparent white prismatic needles, without odour, but having an acrid, burning taste; soluble in about 300 parts of water, very soluble in alcohol, less so in ether; its solutions are alkaline. Daturia combines with, and neutralizes acids: the solution of the salts are precipitated by tannic acid, and also by the chloride of gold. It has been recently examined by Dr. Von Planta, and found to have the same composition as Atropia. Formula, C_{34} H_{23} NO_6.

The medicinal virtues of the herb are extracted both by water and alcohol. The watery infusion is transparent, with a very pale yellow hue, which is dissipated by acids, but very much deepened by the alkalies. It throws down whitish precipitates with acetate and diacetate of lead, and a black precipitate with nitrate of silver. Solution of sulphate of iron strikes a deep olive colour, and bichloride of mercury renders it milky; but neither is precipitated till after a very considerable time.

Medical properties and uses.—Thorn-apple is narcotic and anodyne, but not soporific. In some respects it resembles belladonna, causing dilatation of the pupils, obscurity of vision, and headach. It sometimes purges, at other times operates as a diuretic. Baron Stoerck first recommended it as an internal remedy in cases of mania and epilepsy; but, as Cullen remarks, he was less violent in his commendations of it than of the other narcotic plants which he introduced.[2] It was afterwards tried by other continental physicians with unequal success; particularly by Greding, who made the greatest number of trials of it. But the most decided experiments in its favour have been made by Dr. Barton, of America, who regards it as a remedy of great efficacy. He found that, when the dose of the dried herb was gradually increased to thirty grains, it dilated the pupil, and produced paralysis of the eyelids; effects which were removed by a blister. Cataplasms of the bruised fresh leaves have been successfully used as an application to inflammatory tumours, and for discussing masses of indurated milk in the breasts of nurses; and an ointment made with the powdered leaves allays the pain of hæmorrhoids. Smoking the plant in the manner

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[1] *Gmelin, Handb. d. Chim. Bat.* ii. § 1305.

[2] *Materia Medica*, ii. p. 281.

of tobacco affords relief in the paroxysms of spasmodic asthma; a practice introduced into England from Ceylon by General Gent, who fell a victim to its use. It requires, indeed, great caution. Dr. Bree, who tried it in 82 cases of asthma, gives an unfavourable opinion of its influence.[1] The inspissated, expressed juice of the leaves has been usually given; and the extract has been lately found almost specific in severe chronic pains. The seeds are more powerful than the herb. The root is given by the native practitioners in the Carnatic, in violent headachs. Hufeland recommends the form of tincture. The dose of the powdered leaves is gr. j., that of the seeds gr. j. to grs. v.; the dose of the extract, at first, should not exceed gr. ss. twice a day, increasing the quantity gradually as much as the habit will bear.

Several instances of the fatal effects of stramonium, when eaten by mistake, are recorded by authors.[2] It produces at first intoxication, with intense redness of the face, then high delirium, stupor, convulsions, furious madness, paralysis, cold sweats, and death. In some cases, the skin of the face, neck, and breast, were covered with brilliant, stellated petechiæ. When death does not ensue, the attack terminates with a troublesome itching, which slowly subsides. As these effects depend on a determination of blood to the head, bleeding is indicated: no antidote is known: but the free use of vinegar, after the stomach has been emptied, has been found useful.

Officinal preparations.—*Extractum Stramonii,* L. E. *Tinctura Stramonii,* D.

DAUCUS. *Spec. Plant. Willd.* i. 1389.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

G. 53. *Cor.* somewhat rayed. *Flor. of the disk* abortive. *Fruit* hispid with hair.

Species 1. D. *Carota.*[3] Common Carrot. *Med. Bot. 3d edit.* 130. *t.* 50. *Smith, Flor. Brit.* 300.

Officinal. CAROTA, *Lond. Edin. Dub.* Recent root of Daucus Carota (var. Sativa), L. E. Root of Daucus Carota, D. Common Carrot.

Syn. Carotte (*F.*), Karotte, Mohrrübe (*G.*), Karoot (*Dutch.*), Derreurt (*Dan.*) Morot (*Swed.*), Marchew (*Pol.*), Carota (*I.*), Zanahoria (*S.*), Cenoira (*Port.*), Jezer (*Arab.*), Gajer (*H.*), Garjara (*San.*), Carrot halung (*Tam.*), Zerdek (*Pers.*).

The carrot is a biennial indigenous plant. In its wild state it is found abundantly in pastures and on hills[4]; flowering in June

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[1] *Lond. Med. and Phys. Journ.* xxvii. 51.

[2] It is said to be sometimes used by the Turks instead of opium, or as a substitute for wine; and the Chinese infuse the seeds in beer. — *Spratt's Hist. of the Roy. Soc.* 162.

[3] Σταφυλινος αγριος Dioscoridis.

[4] We have seen it in great abundance on the range of chalk hills which overlook Ryegate in Surrey.

and July. It is cultivated for culinary purposes and feeding cattle. The root is spindle-shaped, fleshy, and of a yellow colour: throwing up a round furrowed stem, which rises about two feet in height, and sends off long, erect, naked, floriferous branches: the leaves are large, petiolated, thrice-pinnate, cleft, and hairy: the flowers are in many-rayed compound umbels, flat on the top, and spreading, but after the flowering season they become condensed in a concave form: the involucre consists of several narrow trifid leaves; the involucel is more commonly simple: the marginal flowers are white or yellow; the central, which are abortive, often of a dark blood colour: the seeds are in pairs, egg-shaped, convex, rough, and bristled on one side, and flat on the other. These appearances are changed by cultivation, which also increases the size and the nutritious matter of the root.[1]

Qualities. — The sensible qualities of the *root* of the *cultivated carrot* are well known. It contains chiefly *mucilage, pectin, crystallizable* and *uncrystallizable sugar;* the wild carrot is acrid, bitter, and strongly aromatic; and contains a colouring principle which is extracted by ether; and crystallizes in small ruby-red crystals. The *seeds* of the *wild* variety have an aromatic odour, and a warm pungent taste; qualities depending on a volatile oil, which may be separated by distillation with water. It has the odour of the carrot, and a strong, disagreeable taste. Its sp. gr. is 0·8863. It is soluble in alcohol and in ether. Thirty-four pounds of the root yield half a drachm only of the oil.

Medical properties and uses. — The root of the garden carrot is emollient and antiseptic, and is successfully used when boiled and beaten to a pulp, as a poultice to correct the discharge of fœtid and ill-conditioned sores, and to allay the pain of carcinomatous and phagedenic ulcers. The seeds are carminative and diuretic, and hence useful in flatulent cases: but they possess no efficacy in gravel, for which they have been extolled.[2]

The dose of the bruised seed is from ℈j. to ʒj. or more.

DELPHINIUM. *Spec. Plant. Willd.* ii. 1226.

Cl. 13. *Ord.* 3. Polyandria Tryginia. *Nat. ord.* Ranunculaceæ.

G. 1061. *Calyx* none. *Petals* five. *Nectary* bifid, horned behind. *Pods* three or one.

** *Three capsuled.*

Species 13. D. *Staphisagria.*[3] Staves-acre. *Med. Bot. 3d edit.* 471. *t.* 168.

Officinal. STAPHISAGRIA, *Lond. Edin.* Staves-acre seeds.

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[1] Carrots are seldom sufficiently boiled: but when well boiled, they are very digestible and nutritious.

[2] The red central flowers of the umbels have been extolled in epilepsy.

[3] Σταφις αγρια Dioscoridis.

Syn. Staphisaigre (*F.*), Stephanskraut, laus-körner (*G.*), Luiskruid (*Dutch.*), Lunsurt (*Dan.*), Staffansört (*Swed.*), Gnidosz ziele (*Polish*), Stafisagria (*I.*), Piojera (*S.*), Alvarraz (*Portug.*).

This species of larkspur is a biennial plant, a native of the south of Europe, flowering from June to August. It is a handsome plant, from one to two feet in height, with a downy, erect, purplish, simple stem, and palmated leaves, the lobes of which are five or seven in number, of a pale green colour, oblong, ovate, and sometimes acutely indented. The flowers are of a blue or purplish colour, on an open terminal spike, and supported on long pedicels; the uppermost petal projected backwards so as to form a hollow spur, which encloses two spurs of the superior leaflets of the nectary. The filaments are about twenty, and short, bearing large yellow anthers: the germens three, close together, tapering, downy, and crowned with short filiform styles, having simple stigmas. The seeds are rough, brown, triangular, and contained in straight oblong capsules. They are usually imported from Italy, and other parts of the Mediterranean, in bales and casks; for although the plant is occasionally raised in our gardens[1], yet it is difficult to preserve it through the winter so as to enable it to perfect its seed.

Qualities.—Staves-acre seeds have very little odour, but that little is disagreeable: their taste is bitter, acrid, and hot. They are yellowish within, and covered with a rough blackish cuticle. Their virtues are partially extracted by water, and completely by alcohol. MM. Lassaigne and Feneulle discovered that their active properties depend on a peculiar alkaloid, which they named *Delphine* or *Delphinia.* It is found in the plant in the state of a malate (?). It is a white powder, inodorous, acrid and bitter to the taste. When heated to 248° it melts like wax, and again hardens on cooling; and in a high temperature burns, leaving a little charcoal. It is scarcely soluble in cold water, but very soluble in alcohol and in ether. It unites with acids forming neutral salts. Delphinia in a separate state exerts poisonous properties, even in small doses, acting chiefly on the nervous system. To procure it, the powdered seeds must be boiled in distilled water, and pressed through a cloth; the decoction filtered and boiled for a few minutes with pure magnesia; re-filtered and the residuum left on the filter boiled with alcohol; and, lastly, the alcoholic solution cautiously evaporated. The formula of Delphinia is $C_{27}\ H_{19}\ N\ O_2$.

Medical properties and uses. — These seeds are emetic, and cathartic, but their operation is so violent that they are never internally administered. Owing to their stimulating powerfully the salivary gland, when chewed, they have been used as a masticatory in toothach; but they are chiefly employed in powder, mixed with hair-powder, for destroying pediculi of the head. An ointment

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[1] It was first cultivated in England by Gerard in 1596.

made with ʒ js. of Delphinia, ℥ j. of olive oil, and ℥ j. of lard, has been used as a counter-irritant.

DIGITALIS. *Spec. Plant. Willd.* iii. 283.

Cl. 14. *Ord.* 2. Didynamia Angiospermia. *Nat. ord.* Scrophulariaceæ.
G. 1155. *Calyx* five-parted. *Corolla* bell-shaped, five-cleft, bellying. *Capsule* ovate, two-celled.
Species 1. D. *Purpurea.* Purple Foxglove.[1] *Med. Bot. 2d edit.* 218. *t.* 78. *Smith, Flor. Brit.* 665. *Eng. Bot.* 1297. *Withering's Account of Foxglove. Hayne,* i. 45.
Officinal. DIGITALIS, *Lond. Edin. Dub.* Foxglove leaves; (fresh and dried, *L.*)

Syn. Grande Digitale (*F.*), Purpurrother Fingerhut (*G.*), Paarsch vingerhoed (*Dutch*), Fingerbölle, Fingerhat (*Dan.*), Fingerborrsort (*Swed.*), Paluszniczek (*Pol.*), Digitallo Porporino (*I.*), Dedalera purpurea (*S.*), Deda leira (*Port.*), Naperstianka (*Russ.*).

Foxglove is an indigenous, biennial plant, found growing generally on the sides of hills and roads, where the soil is dry, sandy, or gravelly; and on old walls in moist places; flowering from the middle of June to nearly the middle of August. The root is knotty and fibrous, sending up in the second year an erect stem about four to six feet in height; round, downy, and leafy. The lower leaves are in tufts, large, about eight inches in length and three in breadth, ovate, and pointed, with bordered fleshy peduncles: from among which, in the following year, the flowering stem rises: the upper or stem leaves are alternate, sparse, and lanceolate; and all have bluntly serrated, nearly crenate edges, and a wrinkled, velvety surface, of a beautiful deep green colour, with the under paler and more downy. The flowers, which are numerous, are attached on foot-stalks to one side of the upper part of the stem, so as to allow them to hang down and form a very elegant, terminal, racemose spike. At the base of each foot-stalk is a sessile, pointed floral leaf. The uppermost segment of the calyx is narrower than the other four: the corolla is monopetalous, of an oblong bell-shape, and about the size of the little finger of an ordinary glove, bellying on the lower side with a short, tubular base; the upper lip is slightly cloven, and more reflected than the under, which is larger: the corolla is guarded by long hairs at the mouth: its general colour is a bright pinkish purple, with the tube white, and the bellying part sprinkled on the inside with dark purple spots on a white ground, which give to the outside a speckled appearance: the filaments are white, curved, bearing large, oval, yellow anthers: the germen is pointed, supporting a

[1] It was named *Digitalis* by Fuchsius, (*Plantarum omnium Nomenclaturæ,* 1541,) the first author who notices its medicinal properties, from the German name Fingerhut, a finger-stole. It has been previously described by Tragus under the name of Campanula *sylvestris.*

simple style with the apex cloven: the seed-vessel, which is a pyramidal capsule, with a double partition produced by the inflected margins of the valves[1], contains many small, ferruginous, punctated seeds.

The leaves are the parts of the plant medicinally used. They should be gathered when the plant is in flower, and those only which are fresh selected. Dr. Christison, however, affirms that they are poisonous in April, and may, therefore, be gathered at that time.[2] "The leaf-stalks and midrib should be rejected, and the remaining part be dried: but neither in the sunshine, nor on a tin pan or pewter dish before the fire, nor should the plant be hung up, each leaf separate, in a warm kitchen." The leaves, by all these processes, lose much of their activity with their colour. I have found the best mode of drying them is between folds of bibulous paper. Practitioners ought annually to obtain a supply of the recent leaves, in the month of July, and dry them themselves; as in the herb shops they are often so ill dried that they are useless. The powder should have a bright green hue, and should be kept in closely-stopped opaque phials.

Qualities.—Recent foxglove leaves are inodorous; but in the dried state they have a slight narcotic odour, and a bitter nauseous taste. Both water and alcohol extract their virtues. The watery infusion has a pale olive-green colour, with the unpleasant odour and taste of the plant. It does not precipitate solutions of galls, tartarised antimony, nor sulphate of iron: the last only deepens its colour; but it precipitates infusion of yellow cinchona bark; it produces a yellowish precipitate with bichloride of mercury, and a blackish violet very copious one with nitrate of silver. The dry powder, which should have a beautiful green colour, moistened and triturated with lime or calcined magnesia, and a glass rod dipped in hydrochloric acid held over it, exhibits copious white fumes, proving the presence of ammonia. The presence of ammonia is also apparent in the tincture, which is rendered milky by water.[3] In 1811, I made the following experiment:—Ten grains of the powder were macerated in f℥ ss. of sulphuric ether, they lost three grains of weight, and yielded all the colour of the leaves to the ether. The ethereal tincture, on being evaporated on water, left a pellicle of dark green, unctuous, resinous, bitter acrid matter, whilst some yellowish extractive was dissolved in the water, and was precipitated afterwards by chlorine. From this imperfect analysis, fox-

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[1] *Gærtner de Fructibus*, &c. i. 247. t. 53. f. 6.

[2] *Dispensatory.*

[3] Destouches, a French chymist, who analyzed foxglove, obtained also much carbonate of ammonia by distilling the aqueous extract. He obtained, besides, sulphate of potash and of lime, phosphate of lime, carbonates of lime and of potash, and acetate of ammonia.

glove appeared to contain *extractive* and a *deep-green resinous matter*, in which its narcotic power resides.[1]

More recent analysis by M. Leroyer, of Geneva, discovered a peculiar principle, which was termed Digitaline, or Digitalia. It is procured by digesting the leaves in ether, filtering and evaporating, and dissolving the residuum in water, which is filtered, and then treated with hydrated oxide of lead; which being evaporated, and the residuum digested in ether, yields up the digitalia, which is obtained in the separate state by evaporation. It is a brown pasty substance, very bitter, uncrystallizable and deliquescent: and slowly restores the colour of litmus paper reddened with an acid.[2] Dr. Graves, of Dublin, first doubted the alkaline nature of this principle[3]; and his doubts were, in 1837, confirmed by M. Dulong, of Astafort. He found it to be a bitter, acrid extract, composed chiefly of chlorophylle, resin, a fatty matter, and salts of lime and potassa. It is very soluble in ether and alcohol, insoluble in water, unless acidulated. If these statements were correct, the infusion of foxglove would be useless, an idea which experience contradicts.

In 1845, M. Homolle published a Memoir on Digitalis, in which he announced the separation of the active principle in a tolerably pure form; and, in 1851, MM. Homolle and Quevenne wrote an-another Memoir on the same subject; the substance at first named *Digitaline* being found by them to be of a complex nature. These chemists find in Digitalis the following substances: —

1. *Digitaline.* A white, inodorous, non-crystallizable body, occurring usually in mamillated masses, very bitter, causing violent sneezing when pulverized, neutral in reaction, soluble in about 2000 parts of water, very soluble in alcohol, but very slightly so in ether. With strong hydrochloric acid a fine green colour is produced. Its formula is unknown, but it appears not to contain nitrogen. The chief activity of the drugs seems to reside in this principle.

2. *Digitalose.* A neutral body, in micaceous scales, very like cholesterine, insipid, soluble in strong alcohol, moderately so in ether, insoluble in water; melts at a high temperature.

3. *Digitalin.* Neutral, occurs as a white powder, soluble in alcohol, insoluble in ether, precipitated from its alcoholic solution by caustic potash.

4. *Digitalide.* A neutral body, occurring in white scales, insoluble in ether; little soluble in concentrated, but very so in weak, alcohol, and still more so in water.

The leaves of foxglove, as collected by herb collectors, are sometimes mixed with those of Verbascum *thapsus,* and Symphytum

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[1] M. Radig found acetate of potassa in the leaves of foxglove.

[2] *Bib. Univ.* xxvi. p. 102.

[3] *Dublin Journ. of Med. Science*, vol. xv. p. 190.

officinale. The former are velvety and thick, and only feebly bitter; the latter are harsh, hairy, and merely mucilaginous to the taste.

Medical properties and uses.—Digitalis is sedative and diuretic. It sometimes at first quickens and fills the pulse; but afterwards weakens the force of all the vital functions; and, by a proper exhibition of it, the frequency of the pulse may be diminished any number of pulsations, and regulated at the pleasure of the practitioner; whilst at the same time it admits, to a certain extent, of the employment of such medicines as increase the firmness of the arterial action, and give tone to the habit. When given to the full extent of which the system can admit, it is apt to accumulate; the pulse intermits; and vertigo, indistinct vision, and nausea with vomiting or purging occur; and if, after these indications, the quantity be still increased, or if any considerable portion of the recent herb be inconsiderately swallowed, it produces delirium, hiccough, cold sweats, convulsions, syncope, and death. It is supposed to quicken the action of the absorbent system; but although the discharge of urine is very considerably increased during its use, and the load of water with which the body is oppressed in dropsies be thrown off, yet it is not easy to conceive how it can operate on the absorbents; and therefore the modus operandi of foxglove, in producing its diuretic effect, may be regarded as still unexplained[1], although it must probably operate as a direct stimulant to the kidneys.

As a *sedative,* foxglove was early used in some acute diseases, but its powers were not understood. It is employed in inflammatory diseases; in active hæmorrhages, particularly from the uterine vessels, when the pulse is sharp, throbbing, and frequent, and in most cases of increased vascular action, or in which it is essential to lessen the usual impetus of the blood, as in aneurism; but in such cases it should be administered in doses sufficiently large to induce, rapidly, its sedative influence. In mania it acts as a narcotic, soothing the nervous system and procuring sleep to the patient. The tincture is the best form of administering it in this disease; and the dose may be carried to an extent far beyond that which can be prescribed in any other malady.

It was prescribed in phthisis so early as 1710; and great praises were bestowed on it by a writer of that period.[2] Dr. Ferrier found its utility in this complaint much increased by combining it with

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[1] Dr. Baildon observed a curious effect of posture in ascertaining the real effects of digitalis on the pulse. When, by gradually increased doses, he took it to the extent of grs. vj. in the day, the pulse fell to 40 from 110. But when it was actually at 40, the erect posture would raise it to 100; when sitting it was 72; and when lying down, 40. He observed the same effect in several patients to whom he gave it.—*Edin. Med. and Surgical Journal,* iii. 271. [Dr. Guy's experiments on the pulse at once explains this.—Ed.]

[2] *Salmon.* See *The Edin. Med. and Surg. Journal,* v. 303.

myrrh and sulphate of iron[1]: but it has often proved hurtful in the early stage of the disease. Its use has also been extended to venereal ulcerations, chronic rheumatism, hooping-cough, and some spasmodic affections. As an external application, it has long been used in Italy[2] to cleanse all sores: and Hufeland recommends it to be used in the form of fomentation for dispelling glandular swellings.

Foxglove has been used indiscriminately to reduce the pulse in inflammation, and in fevers, but upon mistaken principles. It operates more as a narcotic than a sedative. In hæmorrhages and diseases of the heart it is also a doubtful remedy.

As a *diuretic*, the use of foxglove was re-introduced by Dr. Withering in 1775.[3] He found that its beneficial effects in dropsies were more certainly obtained in those constitutions in which there is a laxity of fibre, a pale countenance, a feeble intermitting pulse, and a cold skin; and where the swelling easily pits. But in florid habits, with great strength, tense fibre, and hot dry skin, no diuresis follows. "If the belly," says Dr. Withering, "in ascites be tense, hard, and circumscribed, or the limbs in anasarca be solid and resisting, we have but little hope."[4] Experience has confirmed these judicious observations: and it is found that where this favourable state does not exist, it should be produced by bleeding, and the free use of neutral salts, and calomel, before foxglove is administered. The diuretic effect is checked when much nausea is present; and Withering says purging also checks it; but I have not found this to be the case. The kinds of dropsy in which its influence is most useful are ascites, anasarca, hydrothorax, and that species of swelling which succeeds parturition, namely, phlegmasia dolens, where the legs and thighs swell, become pale and semi-transparent, with pain in both groins, depending on inflammation of the veins. It has also been found of the greatest service, when conjoined with nitric acid, in the dropsy which occurs in broken-down constitutions, that have been long harassed by mercury.[5] Digitalis will not cure dropsy attended with palsy, unsound viscera, or other complications of disease; but by allaying the urgency of the symptoms, it gains time for other medicines to act. No benefit has hitherto been obtained from its use in hydatids, ovarian dropsy, nor in hydrocephalus.

Foxglove, when over-dosed, causes vomiting, purging, great faintness with cold sweats, and a feeble, slow, irregular pulse. It

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[1] *Essay on the Medical Properties of Digitalis.*

[2] Aralda (Digitalis) tutte piaghe salda.

[3] He was induced to try it from finding it the active ingredient in a family recipe for the cure of dropsy, regarding which his opinion was asked.

[4] *Withering's Account*, &c. 186.

[5] *Carmichael on Diseases which have been confounded with Syphilis*, 4to. p. 63—5.

sometimes causes vertigo and disordered vision. The debility which follows is great.

Foxglove is administered in substance, or in decoction, or in the watery infusion, or in tincture (see *Preparations*). When given in substance, it is frequently combined with aromatics, soap, or ammoniacum; and most advantageously with calomel and opium, when it is required only to produce its diuretic effect. It is always proper to begin with a dose not exceeding gr. j. of the powdered leaves, given in a pill twice a day; and gradually to increase it till its effects are apparent either on the kidneys, the stomach, the pulse, or the bowels. The medicine must then be discontinued; but in dropsy it may be repeated after an interval, if the whole of the water be not evacuated. Dr. John Davy found that in soldiers from tropical climates with broken-down constitutions, and diseased livers and dropsy, it could be given to ʒ ss., ʒ j., and even to 105 grs. in twenty-four hours. During its employment, diluents are useful and necessary; and immediately it is discontinued, the strength should be recruited by generous food, steel, and cordial tonics. The deleterious effects of an overdose are to be counteracted by cordials, as ammonia, brandy, mint tea, and opium; and when these are not sufficient, by blisters. When the dose has been given a short time only before medical aid is required, the decoction of yellow cinchona bark should be used with the stomach pump, instead of water.

Digitaline seems to possess all the medicinal properties of the plant: it may be given in does from $\frac{1}{60}$ to $\frac{1}{30}$ of a grain, either in pills or as an alcoholic solution.[1]

Officinal preparations. — *Infusum Digitalis*, L. E. D. *Tinctura Digitalis*, L. E. D. *Extractum Digitalis*, E. *Pilulæ Digitalis et Scillæ*, E.

DIOSMA. *Spec. Plant. Willd.* ii. 1133.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Rutaceæ.

G. 426. *Corolla* consisting of five petals. *Nectaries* five above the germen. *Capsules* three to five, united. *Seeds* calyptrate.

Species 22. D. *crenata*. Crenated Diosma. *Med. Bot. 3d edit. Thunberg, Prod.* 43. N. G. Agathama, *Willd.* Bucco, *Wendland.*

Officinal. BUCKU, *Lond. Edin. Dub.* The leaves of Barosma Serratifolia, *B.* Crenulata and B. Crenata, *L.* Of various species of Barosma, *E.* Of Barosma Crenata, *D.* Buchu leaves.

Syn. Buchu, Bocchoe (*Hottentot*), Buchu (*F.*), Buccoblatter, Götterduft (*G*).

This plant is now removed from the genus Diosma into a new

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[1] For details of the action of Digitaline, see the Memoir by MM. Homolle and Quevenne. Paris, 1851.

[2] The name is derived from βαρυς οσμη.

genus, which has been termed Barosma.[2] It is a native of the Cape of Good Hope. The leaves are borne on the extreme twigs, nearly in a verticillated order; they are petiolate, coriaceous, alternate, sometimes opposite; ovato-lanceolate, nearly pointed, about an inch in length and half an inch in breadth, with the margin crenated; the upper surface is smooth, and of a beautiful bright green; the under is pale, and spread, with many translucent glandular points. The flowers are axillary, solitary, and have the leaflets of the calyx awl-shaped and crenated. But the leaves of at least two species of the genus constitute the buchu of commerce, named B. *crenata,* and B. *serratifolia.*

Buchu is imported from the Cape of Good Hope, and also from Calcutta, in bales containing from 2 to 3 cwt.

Qualities. — The dried leaves, to an inexperienced eye, might readily be mistaken for those of senna. The short petiole which remains attached to them is channelled: the upper surface is smooth, shining, and of a yellowish-olive hue; the under surface is rugose, pale, and studded with large open glands, with an excretory pore in each. The leaves are generally mingled with reddish brown twigs, mottled near the apex with bright yellow, and notched from the separation of the leaves. The whole exhales a powerful, not unpleasant aromatic odour: the taste impressed on the tongue by chewing the leaves at first resembles that of peppermint; but when chewed for some time, a pungency and sweetness are left on the tongue. These properties are imparted both to boiling water and to proof spirit. According to the analysis of M. Felix Cadet de Gassicourt[1], Buchu leaves yield of *volatile oil* 0·665 parts, *gum* 21·170, *extractive* 6·170, *chlorophylle* 1·100, *resin* 2·151, and *lignin* 69·744 = 100·000. Brandes, besides the above, found *albumen, bassorin, malic acid, acetic acid,* and some salts of *lime* and *potassa.*[2] The bitter extractive is asserted to be a peculiar principle, and has been named *Diosmin.* Their active principles seem to depend on the volatile oil and the extractive.

Medical properties and uses. — Buchu leaves are excitant, sudorific, and diuretic. They seem to act specifically on the skin and kidneys: buchu had been employed for some years both in England and Germany, before it was admitted into the London and the Dublin Pharmacopœias. The profession was indebted to Dr. Reece for its introduction, but nothing precise was known of it until its properties were investigated by Dr. M'Dowell[3] and Dr. Jackson.[4] It has been found useful in chronic rheumatism, particularly when it assumes an intermittent character; in chronic catarrh; and in chronic inflammation of the bladder, and retention of urine.

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[1] *Journn. de Chim. Med.* iii. 44.
[2] *Gmelin Handb. d. Chim.* ii. 1258.
[3] *Trans. Dub. Col. of Phys.* iv. 121.
[4] *Calcutta Med. & Phys. Trans.* vol. i.

Buchu is given in the form of infusion, and in that of tincture.[1] The dose in powder is ℈j to ʒss.

Officinal preparations. — *Infusum Buchu*, L. E. D. *Tinctura Buchu*, D. E.

DOLICHOS. See *Mucuna*.

DOREMA. *Don. Lin. Trans.* vol. xvi.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.

Essent. Char. Disk epigynous, cup-shaped. *Achenia* compressed, marginate, with three distinct filiform intermediate ribs. The *Valleculæ* with one vitta. The *Commissures* with four vittæ.

Species. D. *Ammoniacum.* Ammoniacum Dorema. *Don, Linnean, Trans.*

Officinal. AMMONIACUM, *Lond. Edin. Dub.* Ammoniacum. Gum resinous exudation of Dorema Ammoniacum.

Syn. Gomme Ammoniaque (*F.*), Ammoniak (*G.*), Gomma Armoniaco (*I.*), Goma Amoniaco (*S.*), Ammoniac (*Russ.*), Ushok or Fooshook (*Arab.*), Semughbilshereen (*Pers.*), Ooshk (*Hind.*).

The plant which yields this gum-resin is a native of Persia; it was brought home by Colonel Wright, and described by Professor David Don, under the name Dorema *ammoniacum.* The Dorema is now admitted as the true source of the drug.

Mr. Jackson, in his account of Morocco, informs us, that the ammoniacum plant, which in the Arabic is named *feshook*, resembles the fennel[2], is ten feet in height, and one inch thick in the thickest part of the stem; and Colonel Johnson describes a plant as that yielding the ammoniacum, which appears to be the same as the feshook. He says that the feshook grows at El-araiche and M'Sharrah Rumellah; and neither bird nor beast is seen near the spot; but it is attacked by a horned beetle, which perforates the stem with its horn, and the juice runs out at the wound. It rises about six feet in height; some of the stems are dark coloured, others of a light green, and tinged with lake-colour near the joints. The flowers are extremely minute, and congregated in small capitals: each flower, when examined by the microscope, is found to consist of five petals, curled inwards, with a kidney-shaped anther. The Dorema, says Mr. Don, is not unlike opoponax; but it is distinguished from opoponax, and also from ferula, by a large, cup-shaped, epigynous disk, completely sessile flowers, and solitary resiniferous canals. It is a robust plant, upwards of seven feet in height, and four inches in circumference at the lower part of the

[1] The Hottentots employ a decoction of the fresh leaves as a vulnerary. — *Burchell's Travels in Africa.*

[2] Both Dioscorides and Pliny describe ammoniacum as the juice of a species of ferula growing in Libya. — *Dioscor.* l. iii. c. 98. *Plin.* l. xii. c. 23.

stem, of a glaucous colour, with a perennial root, and clothed with glandular pubescence. The leaves are large, petiolate, subbipinnate, with subtrijugate pinnæ: the lower leaflets are distinct, the superior confluent, inciso-pinnatifid, with oblong, mucronate, entire segments, rarely sublobate, coriaceous and veined on the under disc, supported on ribbed pubescent petioles, with the base greatly dilated, subvaginant, and stipulaceous. The flowers are produced on proliferous racemose umbels, supported on globose umbellules, with round, woolly peduncles. There is neither involucrum nor involucel. The flowers are sessile. The *calyx* is five-toothed at the margin, the teeth being small, ovate, acute, membranaceous. The *petals* are five, ovate, and acuminately inflex. The *stamens* are five, quickly caducous; the *filaments* are flattened, and dilated at the base: the *anthers* are incumbent and bilocular, with the loculi longitudinally dehiscent. The *ovaria* are roundish, with full, fleshy, cyathiform, plaited, sublobulate, segments. The *styles* are flattened, slightly channelled, with a dilated base. The *stigmata* are truncated. The *fruit* is elliptical, greatly compressed at the back, with a flattened margin, and a broad cincture.[1] The plant is called *Oshac* by the Persians: it is perennial, and grows wild between Yerdekaust and Kumisha, in the province of Irak, exposed to an ardent sun. When the plant has attained perfection, it is pierced by innumerable beetles; the ammoniacum exudes, and when dry it is picked off. The ammoniacum, besides exuding from these punctures, is said to be procured by incisions also, and allowed to drop on the ground, where it hardens by the air and sun, but this is uncertain. There is nevertheless some grounds for the statement, as the ammoniacum brought from Barbary is mixed with a red earth, and is not saleable in the London market. The best ammoniacum is brought from the East Indies, packed in cases and chests, each containing about 2 cwt. It is in large masses, composed of small round fragments or tears; or in separate dry tears, which is generally considered a sign of its goodness. It is occasionally imported from the Levant.

Qualities. — Ammoniacum has a peculiar faint but not ungrateful smell; and a bitter, nauseous, sweet taste. The tears are nearly globular, varying greatly in size; yellow on the outside, and white within; brittle, and breaking with a vitreous fracture. They display a waxy lustre. Their specific gravity is 1·207. Ammoniacum is adhesive in the warm hand, softens by heat, but does not melt; it is partially soluble in water, alcohol, ether, solutions of alkalies, and vinegar. *Lump* ammoniacum consists of agglutinated tears; but sometimes the masses are of a dark colour, and plastic. When

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[1] *Linn. Trans.* vol. xvi. p. 605. Merat and De Lens have published some notices of the plant in the *Dict. Universel de Matière Médicale,* 1829; and an account of it is also contained in *Trans. of the Med. Soc. of Calcutta,* vol i.

either kind is triturated with water the solution is milky, but after some time it lets fall a resinous matter, which is the part of the ammoniacum that is taken up by ether and alcohol. Water or alcohol, when distilled off ammoniacum, brings over nothing from it. According to the analysis of Braconnot, it is composed of 70·0 parts of *resin,* 18·4 *gum,* 4·4 *glutinous matter,* and 6·0 *water* = 100·0 parts; 1·2 parts being lost in the analysis.[1] Hagen, who also analysed it, adds *extractive, volatile oil* and *water.*[2] According to Johnson the formula of the resin is $C_{40}\ H_{25}\ O_9$. I find that sulphuric ether takes up six grains in ten of ammoniacum, and, when evaporated, leaves a yellowish white resin[3], which is long of hardening, and is insipid, although it possesses the odour of the gum-resin: the taste resides in the gum, which in other respects possesses the properties of acacia gum. Water, therefore, is the proper menstruum for ammoniacum.

Medical properties and uses. — Ammoniacum is an expectorant, deobstruent, and antispasmodic; and is in large doses purgative. Externally it is discutient and resolvent. It is prescribed with advantage in asthma, chronic catarrh, and some other pulmonary affections; but, on account of its stimulating properties, its use must be avoided where any inflammatory action of the chest is going forward. As a deobstruent, it is useful in visceral obstructions, hysteria, and chlorosis; and in that peculiar state of the bowels often accompanying hypochondriasis and dyspepsia, in which there is an almost constant degree of colic, particularly after taking food, and which appears to arise from a viscid mucus lodged in the intestines, a combination of ammoniacum and rhubarb is singularly efficacious. As an antispasmodic, Cullen properly considers it the least powerful of the fœtid gum resins. It may be combined with tartarized antimony, squills, assafœtida, and ipecacuanha, to promote its expectorant powers; and with myrrh, iron, and bitters, when its deobstruent properties are required. It is given either in substance, or diffused in water in the form of emulsion. Externally, it is applied under the form of plaster to scirrhous tumours and white swellings of the joints.

The dose of ammoniacum is from grs. x. to grs. xxx.

Officinal preparations. — *Ammoniacum preparatum,* L. *Mistura Ammoniaci,* L. D. *Emplastrum Ammoniaci,* L. E. D. *Emplastrum Ammoniaci cum Hydrargyro,* L. E. D.

DORSTENIA. *Spec. Plant. Willd.* i. 682.

Cl. 4. *Ord.* 1. Tetrandria Monogynia. *Nat. Ord.* Urticaceæ.

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[1] *Annales de Chim.* lxviii. 69. *Thomson's Chymistry,* v. 143.

[2] *Schwartze Pharm. Tubel.* 280. 2. Ausg.

[3] Nitric acid converts this resin into a yellow resino-bitter, which imparts a permanent yellow colour to silk.

G. 214. *Receptacle* common, one-leafed, fleshy, in which solitary seeds are nestled (or placed in sockets without attachment).
Species 5. D. *Contrajerva*, Contrayerva. *Med. Bot. 3d edit.* 705. *t.* 240.
CONTRAJERVA. Contrajerva root. Not now officinal.

Syn. Contrajerva (*F.*), Giftwurzel (*G.*), Contrajerva (*Dutch*), Contraherva (*Port.*), Contrayerba (*I.*), Contrahierba (*S.*).

This is a perennial plant, a native of Peru, Mexico, Jamaica, and some other of the West India islands; but it is said to be the root of several species of dorstenia, namely, D. *Houstoni*, D. *Drakena*, and D. *Brasiliensis*. The rhizome of D. *Contrajerva* is fusiform, knotty, and branching, compact, furnished with many rough fibres; externally of a brown colour, and internally whitish. It sends up several leaves, which are about four inches in length, and the same in breadth; of an irregular shape, but in general deeply laciniated into five or seven obtuse parts; and placed on long radical footstalks, winged towards the leaves. The fructification, which is remarkable, and on radical stalks or scapes, which rise about four inches high, is a fleshy receptacle, shaped like an animal placenta, about an inch long, and three fourths of an inch broad, placed vertically; and containing on the upper surface very small, scarcely conspicuous, flowers, situated closely together, immersed in the receptacle, and occupying the whole of its disc. The capsule possesses an elastic power when ripe, by which the seeds are thrown out with considerable force.

Monardus is the first author who mentions this root, which, he says, is called Contrajerva [1] by the Spanish Indians, on account of its alexipharmic qualities. Dr. Houston [2], however, asserted that the contrajerva was the root of two other species of Dorstenia, the D. *Houstoni* and D. *Drakena* of Willdenow. It is brought to this country from the West Indies, packed in barrels, containing from 80 to 86 lbs. each; in pieces of about two inches long.

Qualities.—Contrajerva root has a peculiar but not unpleasant odour, and a bitterish warm taste, leaving a pretty lasting impression on the tongue. It preserves its qualities when dried, and in the state of powder. According to Geiger, it contains *volatile oil*, *bitter extractive*, and *starch*. Both water and alcohol, assisted by heat, extract its virtues. The watery decoction is of a dark brownish red colour, and exceedingly mucilaginous.—The alcoholic tincture reddens litmus paper, is not altered by a solution of sulphate of iron, but is precipitated by water.

Medical properties and uses.—This root is a stimulant, sudorific and tonic. Huxham and Pringle first pointed it out as a remedy

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[1] The Spanish for the English word *antidote* is *contrahiérba*. The Mexican name of the root is *Tazpatlas*.
[2] *Phil. Trans.* No. 421. p. 195.

well suited to fevers of a typhoid type; and it has been often employed in malignant eruptive diseases, dysentery, and in some kinds of diarrhœa. It is also useful in atonic gout, chronic rheumatism, and the fever attending dentition in weak infants.

The dose of the powdered root is from grs. x. to ʒ ss.; but it is seldom used alone.

DRIMYS. *Spec. Plant. Willd.* ii. 1239.

Cl. 13. *Ord.* 4. Polyandria Tetragynia. *Nat. ord.* Winteraceæ.

G. 1063. *Calyx* three to six sepals, petaloid. *Petals* six or twelve. *Germens* club-shaped. *Style* none. *Berries* four or eight, obovate. D. *Wintera.*

Species 1. W. *aromatica.* Winter's Bark-tree. *Phil. Trans.* xviii. 923. t. 1. f. 1, 2. *Murray's Syst.* 507. *De Candolle, Prodr.* i. 78. *Soland. Med. Obs.* v. p. 46. t. 1. *Hayne,* ix. 6.

DRIMYS AROMATICA; CORTEX. Winter's bark. Officinal in Dublin Pharmacopœia, 1826.

Syn. Cannelles de Winter (*F.*), Winterana (*I.*), Corteza Winterana (*S.*).

The tree yielding Winter's Bark is a native of the Straits of Magellan, growing in valleys which are exposed to the sun. It is, also, indigenous in Chili, Peru, and New Grenada. It is an evergreen tree, rising from six to forty feet; covered on the trunk with a grey wrinkled bark, which is smooth and green on the branches. The leaves are petiolate, elliptical, obtuse, smooth, an inch and a half in length, an inch broad in the middle, glaucous, and dotted underneath. The flowers are axillary, two, three, or more together, on short peduncles of a milk-white colour, with the odour of jasmine: the sepals are 2–3: the petals 6, oblong, oval, obtuse, concave, and erect, the filaments shorter than the petals, supporting large oval anthers; the germens are turbinated, with large sessile divided flat stigmas. The berries are of a light green colour, spotted with black, and contain several black aromatic seeds.

This tree was discovered, and a piece of it brought to England in 1579, by Captain Winter, the crew of whose ship used the bark as spice. It is not often found in the shops: and is frequently confounded with the Canella alba; from which it may be distinguished by being in larger pieces, the inner bark having more of a cinnamon hue, and its infusion being deepened in colour by salts of iron.

Qualities.—Winter's bark has an aromatic odour; and a pungent, hot, spicy taste, slowly imparted but very permanent. These qualities depend on a volatile oil, which can be obtained separate, in distillation with water. M. Henry obtained also *resin, tannic acid*[1], a *colouring matter, acetate of potassa, chloride of potassium,*

[1] Canella alba contains no tannin.

sulphate of potassa, oxalate of lime, and *oxide of iron,* from this bark.

Medical properties and uses.—This bark is tonic, stomachic, and carminative. It has been found efficacious in scurvy, and may be used as an adjunct to simple bitters in dyspepsia; but it is very little used. It may be administered in aqueous infusion of ʒ iv. of the bark in f. ℥xij. of boiling water, in doses of f. ℥ jss. On the Continent it is given in the forms of powder, in doses of gr. v. to ℈j., also in tincture, and infused in wine.[1]

DULCAMARA. See *Solanum.*

ECBALIUM, Officinarum vel Agreste. See *Momordica Elaterium.*

ELATERIUM. See *Momordica.*

ELEMI. See *Amyris Elemifera.*

ELETTARIA CARDAMOMUM. See *Alpinia Cardamomum.*

ERGOTA. (Spermœdia *Clavus, Fries Systema Mycolog.* ii. 268.)[2] *Nat. Ord.* Fungaceæ.

Officinal. ERGOTA, *Lond. Edin. Dub.* Secale cereale. The seed diseased by a parasitic fungus (?), *L.* An undetermined fungus, with degenerated seed of Secale cereale. Ergot of Rye, *E.* The Ergot, a peculiar excrescence, supposed to be caused by a parasitic fungus, *D.*

Syn. Clavus secalinus, Secalis mater, Ergota (*L.*), Seigle Ergoté, Clou de Seigle, Mère de Seigle, Bled averté, Bled farouche, Have ou Rachitique Calcar, Chambucle, Ebrun Faux Seigle, Seigle cornu, Seigle à éperon, Seigle ivré, Seigle noir, Argot (*F.*), Mutterkorn, Afterkorn, Schwarzkorn, Halmensporn, Artzroggen (*G.*), Spoor (*Dutch*), Söm (*Dan.*), Grana allogliata, Segala allogliata (*I.*), Paniee (*Pol.*), Sperinià, Rojki, Spernick (*Russ.*).

The ergot used in medicine is found on the ears of rye. Many and very different opinions have been advanced respecting the origin and nature of ergot. Some, as Schreber, De Geer, Ginnani, Read of Metz, Fontana, and Gen. Field, referred it to a change produced in the grain by the puncture of an insect; M. de Buffon considered it an assemblage of animalcules, resembling eels: others again, as Tessier, Zuckert, Robert, and Willdenow, attribute it to some inimical action of the air, the soil, and the sun: Roessig supposes it to depend on a diseased condition of the whole

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[1] In Brazil it is employed under the name of "Casca d'antig," against colic.—*Lindley's Flora Med.* p. 26.

[2] The London College, in 1836, referred Ergot to Acinula *Clavus,* and quoted Fries (*Syst. Mycol.*), but Dr. Lindley (*Flora Med.*) says that Fries has noticed no such plant in his works.

internal structure of the plant; and Schnieder, to a viscous sweetish substance, which penetrates with the dew into the grain, causing fermentation. It is unnecessary to comment on these and some other hypotheses; the most rational and correct is that first advanced by Dr. Leveillé, who regards it as a fungus, and has named it Sphacelia *segetum.* He endeavours to prove that the ergot consists of a fungoid plant, and the diseased ovary of the grain. It is now pretty generally maintained that ergot is a fungus.

Decandolle and Wiggers maintain that the ovules of this fungus are taken up by the roots of the plant bearing it[1]: but Hartwig, and Dr. Wright, from whose laborious and admirable essay most of the information contained in this article is taken, contend that it is not communicable by contact[2]; but my friend and late pupil, Mr. Quekett, who has carefully investigated the appearance of ergot, in every stage, infected grains of corn by immersing them in water in which the spōridia of ergot were contained; he has examined and accurately described these spōridia.[3] For our purpose this controversy is of little interest. The ergot is found upon rye growing in low damp fields; it appears most abundantly in hot damp summers. The number of ergots on each ear of the rye seldom exceeds five, and the grains in the rest of the ear are healthy; except in some rare instances, in which the whole ear is affected, and appears shrunk, unhealthy, and covered with a black powder.

Many other plants besides the rye are ergoted[4]: but it is the ergot of the eye only which is medicinally employed.

The ergot of the rye is a long, dark-purplish, nearly black body, of a roundish or triangular form; and curved in its length. It retains, more or less, the linear depression of the sound grain; but, occasionally, others are added which extend from one extremity to the other. The length is from six to ten lines; sometimes it has been found one inch and a half[5]: it is curved, commonly tapering; and varies from one to three lines in diameter. The surface, when viewed with a good lens, is found to be studded with translucent, sparkling, white angular dots.[6]

Ergot is fragile when dry, but when moistened it becomes flexible. It breaks with a starchy fracture, presenting a close

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[1] Inquisitio in Secale cornutum, &c. Commentatio præmio regio ornata. Gottingen, 1831.

[2] *Edin. Med. and Surg. Journ.* vol. lii. p. 293.

[3] *Trans. of the Linnean Society.* xviii.

[4] Such is the case with Maize, Darnel, several species of Arundo and Juncus; as well as some of the *Cyperaceæ* and even the *Palmaceæ.*

[5] Aymen had one of this length in his herbarium.

[6] When it is mealy this arises from its being punctured by an insect; and some of the substance of the grain being transferred to the surface. — *Wright, Edin. Med. and Surg. Journ.* vol. lii. p. 296.

structure, of a pale pink hue. When longitudinally divided, small close cavities are observed, branching, filled with a greyish powder and shining granules. It has a heavy mawkish odour, and an acid nauseous taste, leaving a slight sensation of heat on the palate. When kept in a damp place, it softens, swells, becomes intensely black, and loses its native properties: this is more rapid when it is kept in powder; and, under such circumstances, it becomes covered with animalcules in a few days. It should be preserved in dry bibulous paper, in close-stoppered bottles. The characters of good ergot are, clearness and smoothness of the surface, not powdery; the colour a deep purple, neither light, brown, nor black; and the odour full and strong. It should also display the internal pink blush; it should swim on water, and burn with a clear, jetting white flame.

Qualities.—Ergot, boiled in water, affords a deep claret-coloured solution, having the odour of the entire substance; and, if not long boiled, the decoction contains its active principle; but long boiling renders it inert. When cold, the decoction throws up a fatty pellicle on the surface.

Decoction of ergot shows the presence of a free acid when tested with *litmus.* Vauquelin supposed this to be the phosphoric acid from its fixedness; and its action on *lime water, barytic water,* and *chloride of barium, nitrate of silver,* and *acetate of lead,* with all of which it forms precipitates soluble in nitric acid. *Liquor Potassæ* colours it fawn, renders it flocky, and throws down a light brown precipitate; and *Liquor Ammoniæ* one which is pinkish. The *carbonates of alkalies* precipitate it greyish pink; *lime water* bluish. The strong acids form a yellow coagulum. *Infusion of galls* throws down a tannate of starch. Alcohol takes up some of its active matter; but water is its best solvent.

When ergot is treated with alcohol, and the spirit distilled off from the tincture, a fixed oil is procured having the odour of rancid fish oil: the alcohol also has a putrid odour. Ergot distilled *per se* affords an empyreumatic, thick, light-brown, and nauseous acrid oil: the powdered ergot, put in a canvass bag, and pressed between heated iron plates, yields a fluid, lighter-coloured and less offensive oil than that procured by distillation. By digesting ergot in liquor potassæ at 120° Fahr., and then diluting the saponaceous substance thus formed, with half its weight of water, adding to neutralization sulphuric acid, and submitting the whole to distillation in a saline water-bath, a white, adhesive, fatty-looking, tasteless oil is procured.

Pure oil of ergot is colourless, translucent, with an odour similar to ergot, and an oily, slighty acrid taste. It volatilizes by long continued heat; but, if the process be stopped and the oil cooled, it almost solidifies. Light and air deepen its colour. It is lighter than water, to which it yields its odour, but nothing more. It is

soluble in alcohol, naphtha, ether, all the volatile oils, creosote, pure alkalies, ammonia; and also in olive and almond oils. The concentrated mineral acids clear it. It is thickened, deepened in colour, and weakened, when long exposed to light and air; but it retains its properties for years when kept in a well-stoppered bottle.

Many analyses have been made of ergot, the best of which, in my opinion, is that of Mr. Wright, who regards the following as its constituents — a *thick white oil*, 31·00 + *osmazome* 5·00 + *mucilage* 9·00 + *gluten* 7·00 + *fungin* 11·40 + *fecula* 26·00 + *salts* 3·10 + *colouring matter* 3·50 + loss 3·50 = 100·00 parts. The fecula differs from starch in not being coloured blue by iodine, nor being soluble in nitric acid. I have found that ergot also contains ammonia; for when it is bruised in a mortar with an alkali, it forms a white vapour, if a rod dipped in hydrochloric acid is held over the mortar. Mr. Wright says, "ergot appears to differ from sound rye, chiefly in the presence of oil, osmazome, and fungin;" and he considers the action of the oil to be the same as that of the ergot itself. Ergot has been analysed also by M. Legrip, whose results accord with those obtained by Mr. Wright. Wiggers supposed he had isolated the active principle, which he named Ergotine; others have been unsuccessful in their attempts to obtain it.

It seems that the active principle of ergot, of whatever nature it may be, is contained in the oil obtained by means of alcohol and ether; but that it is not the fixed oil itself is rendered probable from the fact that, when obtained by expression alone, it is destitute of the peculiar properties of the ergoted rye.

Many epidemics which have almost depopulated the northern kingdoms of Europe have been ascribed to the ergoted rye, being used in the form of bread. But although this state of the rye may in some degree, in conjunction with defective nutriment and other causes, have contributed to produce these gangrenous epidemics, yet Mr. Wright has hinted, with much show of probability, that the fatality in these cases was due more to the imperfect nutriment afforded by the ergoted bread, than to any direct poisonous properties of the ergot.[1] If ergot, however, is capable of producing poisonous effects on healthy individuals, there is every reason for believing that it might induce epidemic diseases, in seasons in which it abounds in the north of Europe. We are informed that when mules are fed with ergoted maize, in South America, they lose their hair, and their hoofs; and hens fed with it lay eggs without shells. The active principle of ergot is probably an acrid ammoniacal oil, which is taken into the circulation, and acts on the spinal cord.[2]

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[1] For a succinct account of these epidemics, see the *Edin. Med. and Surg. Journ.* vol. lii. p. 307—319.

[2] The oil is now an article of commerce. It is procured by acting upon bruised

Medical properties and uses. — The experiments of Dr. T. Wright[1], with decoction of ergot, appear to justify the following conclusions in reference to its physiological influence on the animal system.

"1. That solutions (*infusions* or *decoctions*) of ergot injected into the arteries and veins affect chiefly the brain and the nervous system. 2. Both of these parts may be influenced together, as coma, more or less perfect, and paralysis appearing at once: or the spinal cord may be first affected, and paralysis immediately resulting, whilst the brain participates subsequently, so that the comatose period is much delayed. 3. Its effects differ according to the strength of the solution employed. In a concentrated form it appears to paralyse the system instantly, no resistance to its influence being discernible. A milder preparation causes for a time great excitement, the nervous system is roused, but sinks eventually under the influence of the poison." A much diluted solution produces a slow but progressive sedative action, which exhausts and kills. Such is the influence of ergot when injected into the veins of quadrupeds: its action is more energetic when it is introduced into the arteries.

When ergot is swallowed, in the state of powder, by dogs and rabbits daily, in large doses, little or no obvious effects follow for some weeks; the powers of digestion then fail; after which paralysis of the hind legs, extending to the rest of the body, with emaciation, complete depression of the powers of life, and loss of the mental energies, next display themselves, and the animal dies. On *man* the effects on the nervous system are more striking. Its operation is clearly that of a narcotic; first exciting both the nervous and the vascular systems, and then depressing them. When a large dose is taken, whatever is the sex of the individual, a sensation closely resembling formication is experienced in the feet: this is speedily followed by contractions of the muscles of the lower limbs, pain of the head, vertigo, delirium, and sometimes opisthotonos, or violent contractions of the dorsal and lumbar extensor muscles sufficient to curve the body backwards, so that the occiput approaches to the hips. It is thus evident that ergot operates powerfully on the motor tract of the spinal cord, and especially on the extensor muscles. Many cases illustrative of this opinion might be quoted. I once witnessed its effects on a lady to whom it had been given in doses only of half a drachm, once in four hours, with the view of aiding the expulsion of a blighted fœtus. She suffered the most violent head-ache, stupor, and dilirium; and was only relieved by cupping. Convulsions, also, have occasionally

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ergot with ether, distilling off the ether by a very gentle heat, and then leaving it to spontaneous evaporation. The colour of the oil is pale reddish brown; its taste acrid: it is lighter than water, and soluble in alcohol and solution of pure potassa.

[1] *Edin. Med. and Surg. Journ.* vol. lii. p. 302.

followed its use; and there is no reason for doubting its power to produce dry gangrene when it has been employed in food. During bad harvests in the north of Europe, where rye is a staple article of diet, this has often occurred. At the same time it is proper to state, that many experiments are on record, in which individuals have taken large quantities of ergot without suffering any inconvenience.[1]

As a topical application, ergot, both in substance and in the form of infusion, checks hæmorrhages when it is applied to bleeding vessels.[2]

Ergot has been used, for upwards of two centuries, as the means of facilitating parturition[3]; and an account of its influence in this respect was published by Camerarius in 1668. But it does not appear to have been used by the profession sooner than 1747, when it was employed successfully as a *secret* remedy by a Dutch accoucheur. Its improper use, however, and the injury sustained by it, caused it to be put down by a legislative enactment in France; and although it was secretly employed, yet it underwent various fortunes, until 1807, when the attention of the profession was again directed to it by Dr. Stearns of New York. His observations were confirmed by Dr. Prescott, another American physician, in 1813; and since that time it has been very generally used as an aid to parturition.

As in the case of every important medicine, the utmost diversity of opinion prevails respecting its influence in parturition, many practitioners and authors regarding it as inert[4]; others as a most dangerous remedy[5]; and others, again, considering it not only safe, but one of the most valuable aids in the process for which it is most frequently prescribed, which has ever been employed.[6] There is much reason for believing that, notwithstanding the contrary opinion of many celebrated accoucheurs, ergot is not likely to cause abortion. As Mr. Wright justly remarks, it augments, but does not originate, the uterine action[7]; and the experiments of the

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[1] Those who are desirous of examining the evidence on both sides of the question, will find the most ample references in Mr. Wright's valuable experimental inquiry (*Edin. Med. and Surgical Journ.*, vol. liii. p. 9. 21.). The experiments of Mr. Wright himself are most conclusive upon the subject; and satisfactorily prove the *narcotic* influence of ergot.

[2] *Edin. Med. and Surg. Journ.* vol. liii. p. 21.

[3] It was in domestic use only; and known by the names *pulvis parturiens; pulvis partum accelerans, poudre obstetricale, poudre ocyatique.* It was also used by the matrons in Scotland; and in America under the name "blasted rye tea."

[4] Le Mercier, Becklard, Le Maire Lyancourt, Basset, Leymais, Dufes, Chaussier, Madame la Chapelle, Desmoreaux, Gardien, Capuron.

[5] Dr. Houston, Dr. Hosack, Dr. W. Moore of New York, Dr. Holcombe, MM. Errat and Moreau, Dr. Hall.

[6] Michell, Drs. Church, Godquin, Voillot, Campaignac, Guersent, Doumerc, Desgranges, Cherreul, Bongiovanni, Bigeschi, Balardine, Henrischen, Davies, Sir C. Clarke, Mackenzie, Mr. Wright, &c. &c.

[7] *Edin. Med. and Surg. Journ.* vol. liii. p. 27.

same acute observer are at complete variance with the opinion that it favours abortion.

The rules for its employment in parturition are the following:—

1. Its use should always be delayed until the os uteri is dilated; and it is not until this occurs that the expulsive influence of ergot is exerted.

2. It should never be employed when puerperal convulsions are present.

When it is employed to favour the expulsion of a blighted fœtus, it should never be administered until the ovum has been ruptured, and the waters discharged. When this rule is neglected, it is apt to cause severe headache, and symptoms threatening apoplexy. When flooding occurs after delivery it is useful in aiding the contraction of the uterus.

Ergot is said also to aid the expulsion of foreign bodies from the uterus[1], and clots remaining after delivery. Many able and celebrated accoucheurs and physicians bear testimony to its influence in checking uterine hæmorrhages, and it has also proved useful in hæmatemesis, hematuria, hemoptysis, epistaxis, and other hæmorrhages.[2] Mr. Ker of Manchester has published a case of its beneficial properties in prolapsus uteri.[3] It has been administered with seeming advantage in amenorrhœa: and even in diarrhœa and dysentery.

Ergot is prescribed in powder, in doses of ℈ j., repeated at intervals of half an hour, until ʒ j. ss. have been taken, in case of protracted labour: and in doses of gr. v. to gr. xv. in hæmorrhages. It is also administered in *infusion* made with ʒj. of the bruised ergot and ℥ vj. of boiling water. *Decoction* is a bad form for employing ergot. The *tincture*, made with ℥ ss. of bruised ergot and f ℥ vj. of spirit of wine, is recommended by Carus. An infusion and simple tincture are now ordered by the Dublin, and an ethereal one by the London, College.

The *oil of ergot* displays the same physiological action as ergot itself, and, from the experiments of Mr. Wright, it appears to operate in the same manner when used as a therapeutical agent; and his experience has been verified by that of Dr. Simpson, the Professor of Midwifery in the University of Edinburgh, and several other practitioners in this country, and also on the continent. In flooding succeeding delivery, says Mr. Wright, "it had the happy effect of calming the irritability of the system, rendering the pulse softer and steadier, and inducing a full and complete uterine contraction."[4] Its power of allaying intestinal irritation

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[1] *Lond. Med. and Phys. Journ.* vol. iv. p. 545.

[2] *Lond. Med. Gazette*, June 26. 1834.

[3] *Ibid.* Feb. 1. 1834.

[4] *Medico-Chir. Review*, April 2. 1839, p. 613. *Edin. Med. and Surgical Journ.* vol. liv. p. 560.

renders it useful in troublesome diarrhœa, and cramp of the stomach.

Oil of ergot has been found useful as a topical application in local rheumatic pains; and as a means of restraining external hæmorrhages.

The dose of the oil of ergot is from 20 to 50 drops. It may be administered in water, warm tea, or weak brandy and water.

As a topical application, also, the aqueous infusion of ergot has been used in paralysis of the eyelids from partial asphyxia caused by inhaling the fumes of charcoal.

Officinal preparations.—*Infusum Ergotæ*, D. *Tinctura Ergotæ*, D. *Tinctura Ergotæ Ætherea*, L.

ERYTHRÆA CENTAURIUM. Formerly called Chironia. *Spec. Plant. Willd.* i. 1065.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Gentianaceæ.
G. 349. *Cor.* wheel-shaped. *Pistil* declined. *Stam.* seated on the tube of the corolla. *Anthers* spiral at the end. *Pericarp* two-celled.
Species 9. C. *Centaurium.*[1] Common Centaury. Med. Bot. 2nd. Edit. 275. *t.* 96. Smith, Flora Brit. 257. Eng. Bot. *t.* 417.
Officinal. ERYTHRÆA CENTAURIUM, *Edin.* The flowery heads of Erythræa Centaurium.

Syn. Petite Centaurée (*F.*), Tausendgüldenkraut (*G.*), Centaura (*I.*), Gentiana Centaura (*S.*).

This is an indigenous annual plant, growing in dry gravelly pastures, and flowering in July and August. The root is small, woody, and branching: the stalk, which rises about a foot in height, is erect, smooth, and quadrangular; divided above into a dichotomus panicle, and branched at the base. The leaves are opposite, sessile, ellipitical, three-nerved, and smooth: the flowers spring from the angles of the division of the stem, sessile and erect, expanding only in the sunshine: the calyx is half the length of the tube of the corolla, five-cleft, with the segments subulate and erect: the corolla is pink or rose-coloured, divided at the limb into five elliptical equal segments, spreading, and somewhat concave. The filaments are bent down, and furnished with oblong, yellow, three-times twisted anthers: the germen is oblong, bearing a simple style, with a clubbed styma.

Qualities.—Common centaury is almost inodorous; but the petals, leaves, and stalk have an intense bitter taste. Both water and alcohol in sufficient quantity extract the whole of its active principles, leaving the insoluble part perfectly insipid. It appears to contain a bitter resin and mucus.

Medical properties and uses.—Common centaury is tonic and antiseptic. Before the discovery of cinchona it was much used

[1] Named, according to Pliny, κενταυριον; from *Chiron* the *centaur*, l. 25. c. 6.

for the cure of fevers, and was one of the ingredients of the celebrated Portland Powder.[1] It is a useful bitter and tonic, and may well supply the place of some of the more expensive remedies of this description in dyspeptic complaints. The dose of the powder is from ʒ ss. to ℥ j.; and of an infusion, made by macerating ʒ vi. of the dried tops in O ss. of boiling water, and straining. From f ℥ jss. to f ℥ ij. may be given three or four times a day.

EUGENIA PIMENTO. See *Myrtus.*

EUPHORBIA.[2] *Spec. Plant. Willd.* ii. 881.

Cl. 11. *Ord.* 3. Dodecandria Trigynia. *Nat. ord.* Euphorbiaceæ.

G. 959. *Corolla* four or five petalled, fixed to the calyx. *Calyx* one-leafed, ventricose. *Capsule* tricoccous.

* *Fruticosæ, aculeatæ.*

Species 2. E. *Canariensis.*

Species 7. E. *Officinarum.*[3] E. *Antiquorum.* Officinal Euphorbium plant. *Amœnit. Acad.* vol. iii. p. 102. *Jackson's Morocco,* p. 81. Koll-Quall, *Bruce's Abyssinia,* vol. v. p. 41.

Officinal. EUPHORBIUM, *Edin.* Euphorbium. Concrete resinous juice from undetermined species of Euphorbia.

Syn. Euphorbe (*F.*), Euphorbium (*G.*), Winkel-euphorbium (*Dutch*), Prustkäda (*Swed.*), Euforbio (*I. S.*), Saynd kadood (*H.*), Ukeil Nefsch (*Arab.*), Nura-shў (*Beng.*), Shuddraykullie paal (*Tam.*).

Euphorbium Officinarum is a perennial, succulent, shrubby plant, a native of Africa, where it grows in great abundance. The plant described and figured by Bruce uuder the name of *Kol-Quall,* and that which Jackson, in his Account of Morocco, says the Arabs and Shellahs call *Dergmuse,* appear to be the same, or varieties of the E. *Officinarum.* When arrived at maturity it has a simple, erect, round stem, about five feet high; angled or furrowed with eighteen or more longitudinal fissures. From the summit branches are thrown out in every direction, going off first horizontally, and

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[1] It is amusing to observe the fate of the various specifics for the gout, which have each held for a time its sway over the public opinion. The following were the ingredients of the Portland powder:—Equal quantities by weight of the roots of birthwort (*Aristolochia rotunda*), and of gentian (*Gentiana lutea*), the tops and leaves of germander (*Chamædrys*), ground pine (*Chamæpitys*), and lesser centaury (*Chironia Centaurium*), powdered and mixed together. Regarding its effects, Heberden says, "Dum fama ejus vigeret, in tot ægris, qui eo usi sunt, podagra vel mitior facta est, vel rarius repetit, ut vix possit dubitari hos effectus isti medicamento esse tribuendos. Quod autem ulla mala ex illo orta sint, præter fastidium, quod modus nimius attulit, mihi quidem nec certum unquam visum est nec verisimile."—*Comment. de Morborium Hist.* 50.

[2] Antonius Musa and Euphorbus were brothers: the former was physician to Augustus Cæsar; the latter to Juba, king of Libya. Cæsar raised a statue to Musa: Juba named this plant after Euphorbus. "Ubi jam Musæ statua? Periit! evanuit! Euphorbi autem perdurat, perennat, nec unquam destrui potest."—*Crit. Bot.* 86.

[3] *Δένδρον εὐφορβίον* Dioscoridis.

then ascending, so as to give to the whole plant the appearance of the skeleton of a large goblet supported on a stalk or foot. The branches are about an inch in diameter, more distinctly angled than the stem, scolloped, and furnished with prickles every where double: it has no leaves, but instead of them, tubercles, adjoining to each pair of prickles. The flowers are sessile, on the extremities of the branches, of a crimson colour. The calyx is of one piece, persistent, with a four or five toothed lip. The petals are four, turbinated, gibbous, thick, truncated, unequal in situation, and fixed by claws to the margin of the calyx. The filaments are more than twelve, thread-like, longer than the corolla, coming forth at different times, and carrying each two globular anthers: the germen is trigonous, with a simple short style, crowned with three semibifid obtuse stigmas. The capsule is tricoccous, pedicellated, elastic; with round solitary seeds.

The succus proprius of all the species of Euphorbia is whitish, and concretes by exposure to the air into a solid substance. The euphorbium brought to this country is said to be the product of some other species, besides the plant we have described: for instance, E. *tetragona*, E. *antiquorum*, and E. *Canariensis* of Willdenow. Mr. Jackson says, that in the lower regions of Mount Atlas the inhabitants collect the concreted gum resin, which they call *furbiune*, in September. It is obtained by making slight incisions in the branches of the plant with a knife, from which a milk-like juice exudes, and forms into tears of an oblong or roundish form. The quantity yielded is so considerable, that the plants are cut once only in four years; the supply then obtained being sufficient for that space of time for all Europe. The recent juice is so corrosive as to erode the skin wherever it touches; and the people who gather the gum are obliged to tie a cloth over the mouth and nostrils, to protect them from the acrid dust of the withered branches, which induces the most violent sneezing.[1]

Euphorbium is imported from Mogadore in serons, each of which contains from 100 to 150 lbs. weight. It is in small, hollow, somewhat forked pieces, which appear as if the euphorbium had concreted round the pedicels of the fruit, or forked spines, and the fruit itself; and it is often mixed with the tricoccus seeds, and other impurities.

Qualities.—It is inodorous; and when first chewed has little taste, but it soon gives a very acrid, burning impression to the tongue, palate, and throat, which is very permanent and almost insupportable. Its specific gravity is 1·129. Water, when tritu-

[1] Bruce says, "When the tree (Kol-Quall) grows old, the branches wither; and, in place of milk, the inside appears to be full of powder, which is so pungent, that the small dust which I drew upon striking a withered branch seemed to threaten to make me sneeze to death, and the touching of the milk with my fingers excoriated them as if scalded with boiling water." — *Appendix*, 4to. p. 43.

rated with it is rendered milky, but actually dissolves one seventh part of only of the quantity employod: alcohol dissolves one fourth part, and affords a clear straw-coloured tincture, which is rendered milky by the addition of water: ether takes up six parts in ten, forming an opaline infusion. When the ethereal tincture is evaporated on water, it leaves on the side of the glass a pellicle of transparent resin, and on the water a cake of opaque adhesive whitish matter, which I found to consist of wax and resin, resembling an officinal plaster; while the water is render milky. The acrimony resides in the resinous matter. The analysis of Braconnot[1] makes 100 parts of Euphorbium to contain 37·0 of *resin*, 19·0 *wax*, 20·5 *malate of lime*, which was mistaken for gum, 2·0 *malate of potassa*, 5·0 *water*, 13·5 *woody matter*, and 3·0 *loss*. He regards the resin as peculiar, from its being insoluble in alkalies, but soluble in the sulphuric and nitric acids. It is improperly termed a gum resin. Brandes analysed it in 1819[2], and gives the following as its constituents: — 43·77 *resin*, 14·53 *wax*, 4·84 *caoutchouc*, 18·82 *malate of lime*, 4·90 *malate of potassa*, 0·70 *salts*, 6·44 *water*, and 5·60 *lignin* = 100·00.

Medical properties and uses. — Euphorbium possesses powerful cathartic, emetic, errhine, and rubefacient properties. It has been given as a hydragogue in dropsies; but owing to the violence of its effects, its internal use is now exploded: neither as an errhine can it be used alone; for it occasions so much inflammation as to produce hæmorrhage from the nostrils, and swell the integuments of the head. When properly diluted, however, with starch or any other inert powder, and cautiously used, it is an effectual and excellent errhine in lethargy, deafness, palsy, amaurosis, and similar cases.

It is contained in *Acetum Cantharidis*, E.

EXOGONIUM PURGA. See *Convolvulus.*

FARINA. See *Triticum hybernum.*

FERRUM. Iron.

Syn. Fer (*F.*), Ferro (*I.*), Eisen (*G.*), Ijzen (*Dutch*), Jern (*Dan. Swed.*), Ferro (*Port.*), Zelaco (*Pol.*), Hierro (*S.*), Gelezo (*Russ.*), Loha (*H. Duk. Sam.*), Ayas (*Sun.*), Sōw-ik (*Esquimaux*), Sheljeso (*Russ.*), Eerumboo (*Tam.*), Ahun (*Pers.*), Hedeed (*Arab.*), Bessee (*Malay*), Yakada (*Cing.*).

This metal is one of the most abundant metallic productions of nature. Its ores are found in almost every part of the globe, but that of Sweden is most esteemed. It is also contained in the soil; often in the water; and as a constituent of vegetable and animal bodies. Iron is procured, —

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[1] *Annales de Chimie*, lxviii. 44.

[2] *Gmelin Handb. d. Chim.*

A. In its metallic state:

i. Alloyed with lead and copper.	Sp. 1. *Native iron.*	
——— with nickel.	2. *Meteoric Iron masses.*	
ii. Sulphureted.	1. *Iron pyrites.*	Var. *a.* Common.
		b. Radiated.
		c. Hepatic.
		d. Capillary.
		e. Cellular.
	2. *Magnetic pyrites.*	

B. United with oxygen:

iii. Oxidized.	1. *Magnetic iron stone.*	Var. *a.* Common.
		b. Iron sand.
	2. *Spicular iron ore.*	Var. *a.* Common.
		b. Micaceous.
	3. *Red iron stone.*	Var. *a.* Red scaly iron ore.
		b. Red ochre.
		c. Compact.
		d. Red hæmatite.
	4. *Hydrate of iron.*	Var. *a.* Brown hæmatite.
		b. Compact hydrate.
		c. Globular hydrate.
		d. Ochrey brown iron stone.
		e. Bog iron ore.

C. Acidified:

	5. *Hydrate of iron and manganese.*	
iv. Salts.	1. *Carbonate.*	Var. *a.* Sparry iron ore.
		b. Common clay iron ore.
	2. *Phosphate.*	Var. *a.* Phosphate of iron.
		b. Blue iron earth.
	3. *Arseniate of iron.*	
	4. *Chromate of iron.*	
	5. *Silicate.*	
	6. *Tungstate.*	
	7. *Sulphate.* Var.	*a.* Pitchy iron ore.

Metallic iron can be extracted from all of these ores, but the oxides are those more commonly wrought; and, in this country, the argillaceous ironstone and the red hæmatite are the kinds in general use. The process varies in different places, but the principles on which it is conducted are everywhere the same. The ore is first roasted by placing it, after it is broken into small pieces, in alternate strata with small coal and lime, either in a kiln, or built up in a pyramidal form on the ground, and setting fire to the lowest stratum of coal. The lime acts as a flux, and forms, with the impurities of the ore, a fusible slag. This part of

the process expels any sulphur, water, or carbonic acid, with which the ore may be combined; and it is then smelted with coke in a conical furnace of the strongest masonry; the heat being raised to a very high degree by passing a blast of condensed air through the furnace; and to facilitate the separation of the melted metal, lime is used as a flux. The scoria or slags are drawn out through an opening towards the bottom of the furnace; and the melted metal, which is collected in a cavity at the bottom, is run off into moulds. In this state it is called pig-iron or cast iron; and requires to be again fused and submitted to the action of the hammer, or passed between rollers, before it is sufficiently pure, either for the purposes of art or of medicine.[1]

Pure forged or bar iron is of a bluish-white or grey colour, of a fibrous texture, and very brilliant in the fracture. It emits a peculiar odour when rubbed, and has a styptic taste. Its specific gravity varies from 7·6 to 7·84. It is attracted by the magnet, and becomes magnetic; properties which distinguish it from all other metals. It is very malleable, but less so than gold, silver, or copper; it cannot be beaten into thin leaves: but is more ductile, tenacious, and elastic than any other metal[2]; and may be drawn into wire smaller than a human hair. Iron can be ignited by percussion, and melts at 158° of Wedgwood. Its surface is soon tarnished and oxidized when exposed to moist air: and the oxidizement is much hastened by the presence of water, which it decomposes.[3] Percussion at a high temperature separates from its surface oxidized scales; the sparks produced by its collision with flint are oxidized: and in the state of wire, when made red hot at one extremity, and introduced into a bottle of pure oxygen gas, it burns with great splendour, and is oxidized in globules. The equivalent of iron is 28.

Iron is of all the metals the least injurious to the animal system, being in no respect poisonous, even when rendered active by oxygen. It was medicinally used by the ancients; for Dioscorides, we know, employed it, quenched in wine, as a remedy for dysentery; and its use was by no means unfrequent as an external application for the cure of malignant ulcers. The effects of iron, or rather its oxides, however, as an internal remedy, were very little understood until more modern times. It acts as a powerful tonic, increasing the general excitement, promoting the digestive powers and healthy secretions, giving a more florid hue to the blood, and

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[1] The mines of the Lower Harz yield annually 14,000 tons of ore.

[2] A square inch of iron wire requires 113,000 lbs. avoirdupois to pull it asunder: the same quantity of copper wire requires 61,000: of platinum wire 56,000; of silver wire 40,000; and gold wire 31,000.

[3] When iron exposed to a moist atmosphere rusts, a protocarbonate is first formed; by degrees the protoxide passes into the hydrated peroxide, and the carbonic acid is evolved; a simple oxide combined with some ammonia remains.

augmenting in a great degree the energy of the muscular system. It answers the intentions for which it is prescribed more effectually when it is given in small doses, minutely divided, as it is found in chalybeate springs; but its use should be long continued. The diseases in which it is beneficial are those which are dependent on, or attended with a weak, languid, leucophlegmatic habit of body, as chlorosis, hysteria, dyspepsia, fluor albus, gleet, passive hæmorrhages, palsy, scrofula, rickets: it is also beneficial in convalescence from almost all acute diseases, and has been recommended as a specific in cancer. The use of iron is contra-indicated whenever the inflammatory diathesis prevails, or there is any particular fulness of the vessels; or an increased secretion of bile, particularly in sanguineous habits. In these states of the system it occasions heat, thirst, headache, laborious respiration, and many other unpleasant symptoms; but when the body is in a proper condition, few medicines are capable of producing more beneficial effects than iron.

For the purposes of medicine, soft malleable iron undergoes various preparations (see *Preparations and Compositions*): but at present we have to notice it only as it is mentioned in the list of materia medica of the British Pharmacopœias.

Officinal. FERRUM IN FILA TRACTUM. FERRI FILUM. FERRI LIMATURA, *Lond. Edin. Dub.* Iron filings and wire, rod iron and turnings.

Syn. Limailles de Fer (*F.*), Gopulvertes Eissen (*G.*), Limatura di Ferro (*I.*), Limadura de Hierro (*S.*), Cerumboo podie (*Tam.*), Sōw-ik (*Esquimaux*).

Iron filings are obtained from the workers in iron; but as they are often mixed with the filings of copper and brass and other impurities, it is necessary to purify them; which is readily done by drawing them up by a magnet covered with a piece of coarse gauze, or placed within a sieve.

Medical properties and uses. — Metallic iron exerts no action on the living system, unless it meets with acid in the stomach, in which case it becomes a tonic, by forming a salt of the metal. Iron filings, therefore, are not adapted for all the cases in which chalybeate remedies prove useful; but they are suited to those cases of dyspepsia, hysteria, chlorosis, and general debility, which are accompanied with acidity in the first passages. When iron is oxidized by water, hydrogen gas is evolved: hence, when the filings are rendered active in the stomach, fœtid eructations are produced, and the fæces are coloured black; which are evident symptoms of the medicine having taken effect. It enters the blood, which becomes more florid: and it may be detected in the urine. It proves beneficial in most diseases of debility: in neuralgia, chronic dysentery; enlargements of the spleen and liver; in chlorosis; and atonic dyspepsia. As an anthelmintic, iron filings may operate mechanically, and dislodge worms; but even in worm cases, the oxidizement of it in the stomach renders it useful. It is

employed as an anthelmintic in ascarides. Sydenham preferred iron filings to the salts of iron, in hysteria and hypochondriasis; but modern practitioners have not followed him in this respect. Iron filings reduce the salts of copper to metal; hence they have been administered in cases of poisoning by these salts.

Iron wire is useful for pharmaceutical preparations, on account of the purity of the iron from which it is made: as the softest and purest iron only can be drawn.

The filings are given in the form of powder combined with some aromatic, or made into an electuary with honey, or in pills in combination with myrrh, ammoniacum, assafœtida, or some bitter extract. The dose may be from grs. v. to ʒss.

Officinal preparation of metallic iron. — *Ferri Pulvis*, D.

FERRI PERCYANIDUM. Prussian Blue.

Syn. Hydrocyanate de Fer, Prussiate de Fer, Bleu de Prusse (*F.*), Berlinerblau (*G.*), Azzuro di Berlina (*I.*), Berlinskaia lazur (*Russ.*).

This salt was originally the production of accident. In 1710, Dippel, a celebrated German chymist, furnished a colour-maker of Berlin, named Diesbach, with a quantity of vegetable alkali prepared from blood, with which he intended to prepare a lake, by precipitating cochineal, alum, and sulphate of iron, with potassa; but instead of the lake, a beautiful blue was produced. This pigment was continued to be formed in the same manner; but it was not till twenty years afterwards that the method of preparing it was made public, and the preparation named *Berlin* or *Prussian blue.* It may be prepared by calcining 100 parts of pearl ashes, the carbonate of potassa of commerce, with 25 parts of animal charcoal made from blood: horn and other animal matters are next added, and again 25 parts of animal charcoal. This mixture is continued in the furnace, and constantly stirred until only a blue flame is given out; it is then taken from the fire, and thrown into water, in which, after brisk stirring, it is left at rest. In twenty-four hours the fluid is decanted, evaporated, and crystallized. To a solution of the perchloride of iron a solution of the above salt is added, as long as a precipitate is thrown down: the supernatant fluid is then decanted off; and the precipitate, being well washed with boiling water, and dried, is Prussian blue. It may be more readily prepared by adding a solution of ferrocyanide of potassium to a solution of sulphate of peroxide of iron, acidulated with sulphuric acid. After the subsidence of the precipitate, the supernatant fluid is to be drawn off, and cold water, acidulated with sulphuric acid, added; and this repeated several times. The precipitate is then to be washed with pure water, and dried.

By the first of the above processes it is supposed that, the calcination of the alkali with the blood and bones azotizing it,

hydrocyanic acid is formed; the union of which with the oxide of iron forms the Prussian blue, or a ferro-sesquicyanide of iron. In the second process, the sesquisulphate of iron acting on the ferrocyanide of potassium, a double decomposition takes place: the potassium is oxidized at the expense of the oxide of iron, and, combining with the sulphuric acid, forms sulphate of potassa, whilst the iron, set free, combines with the cyanogen, and forms the ferro-sesquicyanide.

Qualities.—Prussian blue is of a rich deep blue colour, insipid, inodorous, and much heavier than water, in which it is insoluble. If exposed to the air it partly loses its blue colour, and becomes greenish; but again changes to blue when placed in contact with de-oxygenizing substances. When submitted to a very strong heat, it is decomposed, giving out some pure water, then a small quantity of hydrocyanate of ammonia, carbonate of ammonia, and a residue, which, when calcined in a current of air, is oxide of iron. It contains 7 equivalents of iron to 9 equivalents of cyanogen, and its composition may be represented by the formula $3\ Fe\ Cy + 2.\ Fe_2\ Cy_3$, or $Fe_7\ Cy_9$. In order to ascertain whether it contains alumina or sesquioxide of iron, boil the suspected Prussian blue in diluted hydrochloric acid, and add liquor ammoniæ to the filtered solution: if no precipitate occurs it is free from these oxides.

Medical properties and uses.—Prussian blue has been occasionally used as a medicine. Dr. Zollikoffer, an American physician, gave it successfully in agues and remittent fevers, in doses of one grain, repeated several times a day. He gives it during the paroxysm, and affirms that it does not disagree with the most irritable stomachs. Dr. Bridges, another American physician, recommends it in neuralgia. The dose for an adult is grs. iv. three times a day. Dr. Kirchoff prescribed it with advantage in epilepsy, in doses of gr. j. increased to grs. iij. As an external application, an ointment formed with ʒ j. to ℥j. of cetaceous ointment is used in cases of cancerous ulceration.

FERRI SULPHAS VENALIS. *Lond.* Commercial Sulphate of Iron. See *Ferri Sulphas*, Part III.

FERULA. *Spec. Plant. Willd.* i. 1411.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.
G. 539. *Fruit* oval, compressed, plane, three streaks on each side.
Species 11. F. *Assafœtida.*[1] Assafœtida. *Kœmpfer, Amœnitates Exoticæ,* 536. *t.* 536. *Med. Bot. 3d edit.* 1. *p.* 111. *t.* 43. *Nees von Essen.* 293. *Narthex Assafœtida* (Falconer).
Officinal. ASSAFŒTIDA, *Lond. Edin. Dub.* Assafœtida. Gum resin

[1] Σιλφιον μηδικον Dioscoridis. The plant described and figured by Dr. Hope of Edinburgh, in the 75th volume of the *Philosophical Transactions*, as that which yields the officinal assafœtida, is the Ferula *Persica* of Willdenow, and a native of the north of Persia. Some suppose that the Ferula *Persica* yields the sagapenum. The name *Asa* (not Assa) *fœtida* is said to have been imposed by the monks of the school of Salernum.

exuding from *Narthex Assafœtida*, L. D. *Ferula Assafœtida*, and probably *Ferula Persica*, E.

Syn. Assafœtida (*F.*), Stinkender Asant (*G.*), Assafœtida (*I.*), Asa fetida (*S.*), Assafetida (*Port.*), Durnopashutschnik (*Russ.*), Pérungȳum (*Tam.*), Ingarva (*Tal.*), Angoo (*Malay*), Ungoozeh (*Pers.*), Duivelsdreck (*Dutch*), Dyvelsdreek (*Dan.*), Dyfvelsträck (*Swed.*), Halsüt (*Arab.*), Hing (*H.*), Hingoo (*San.*), Joeul (*Chinese*).

This species of ferula is a native of the south of Persia, chiefly growing on the mountains in the provinces of Khorasan and Laar, where it is named *hingish.*[1] The root is perennial, tapering, and ponderous; when fully grown, the size of a man's leg, covered with a blackish-coloured bark, and near the top beset with strong rigid fibres. The internal substance is fleshy, white, and abounds with a thick, very fœtid milky-looking juice. The stem is round, smooth, and furnished with leafless sheaths; it rises erect to the height of nine feet, and is about seven inches in circumference at the base; surrounded with six or seven radical leaves, nearly two feet long, bipinnate, with alternate pinnules, smooth, sinuated, lobed, or lanceolate; of a deep green colour, and fœtid odour. The flowers are in plano-convex, terminal, compound umbels; the fruit oval, flat, foliaceous or winged, of a reddish brown colour, rough, with three longitudinal lines. They have a strong garlic odour, and a sharp bitter taste.

When the root is four years old, it is fit to yield the assafœtida, which is procured in the following manner:—At the season when the stem and leaves begin to decay, they are twisted off from the root, which is then exposed by digging away the earth that surrounds it. It is left in this state screened from the sun for forty days; then the top is cut off transversely, and after forty-eight hours the juice which has exuded is scraped off, and another transverse section is made. This operation is repeated three successive times, and then the root is allowed to remain untouched for eight or ten days before another section is made. The root perishes after it is exhausted of the juice, which, in general, is not until ten or twelve collections have been made.[2] The juice collected from a number of roots is put together and dried in the sun.

The genuine assafœtida plant seems to be a Narthex, but the gum-resin is probably also yielded by a species of Ferula, as Ferula Persica.

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[1] In 1840, Dr. George Grant, the surgeon attached to an expedition under Lieut. Wood, to the source of the Oxus, found the assafœtida plant in Syghan, on the north-western slope of the Hindoo Cush mountains, north of Bameean. The plant is called there Angooza: but the root, according to Dr. Grant, is palmate.—*Christison's Disp.* p. 191. Assafœtida grows in such abundance on the Hindú Kush, the prolongation of the Himalaya, that it forms the principal pasture of the flocks on these mountains. —*Letter of Lieut. Barnes, Journ. of Asiatic Soc., Sept.* 1832. p. 419.

[2] Assafœtida of an inferior quality is obtained from the Ferula *Persica*, which grows in the steppes near Nukhetriwan. The root leaves differ from those of Ferula Assafœtida, being tripinnate or quadripinnate and delicately divided.

Assafœtida is brought into this country packed in cases, mats, and casks; that in the cases proving generally the best. It is in irregular masses, adhering to each other, externally of a brownish yellow colour, and containing many irregular-shaped shining tears of a whitish, reddish, or violet hue. The best is clear, and of a pale reddish colour, contains many of the white tears, and has the odour very strong. By exposure to air the fresh-cut surface, at first whitish, becomes pink or rose-coloured, and afterwards of a brownish red hue.

Qualities. — Assafœtida has a strong, very disagreeable, alliaceous, fœtid odour, and a bitter subacrid taste; but these qualities, particularly the odour, on which much of the efficacy of the drug depends, are injured by keeping.[1] It becomes brittle by exposure to the air; but is not easily reduced to powder, unless it be triturated with carbonate of ammonia. Its specific gravity is 1·327. It softens in a moderate heat; froths up in a stronger heat; and when ignited, burns with a white flame. It yields all its virtues to ether and rectified spirit. It is diffused by trituration in water, forming a milky opaque mixture, which by degrees lets fall the resin. It is also soluble in liquor potassæ, and in ammonia. The ethereal tincture, when evaporated on water, leaves a thick pellicle of brown, fœtid resin, and gives the water a milky appearance. In distillation, either with water or with alcohol, assafœtida yields an essential oil, on which its odour depends. The components of assafœtida, according to Tromsdorff, are a volatile light oil, a heavy oil, a brown resin, and a bitter nauseous extractive, in which the alliaceous odour of the drug resides: I have obtained of gum 60, resin 30, and essential oil 10 parts, in 100; but Brugnatelli affirms that the part which has been regarded as gum is extractive.[2] Pelletier and Brandes have also examined it, and according to the latter its components are—resin soluble in ether 47·2; resin insoluble in ether 1·6; gum 19·4; bassorin 6·0; volatile oil 4·61; supermalate of lime and some salts 10·5; and loss 10·31 = 100. It also contains sulphur. It is often adulterated with sand, turpentine, and other resins. If soft and containing few tears it is bad, and especially if it exhales a pitchy odour when burnt.

The *resin of Assafœtida* is of a whitish colour, but becomes rose-red by exposure, which probably explains a similar change in the drug itself. It dissolves in concentrated sulphuric acid of a greenish colour.

Oil of Assafœtida, when fresh, is of a pale green colour, but, by keeping, becomes of a brownish tinge; it possesses in an exalted

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[1] Kœmpfer says: — "Affirmare ausim drachmam unam, recens effusam, majorem spargere fœtorem quam centum libras vetustioris, quem siccum venundant aromatarii nostrates." — *Amœn. Exoticæ*, p. 535.

[2] *Compendio di Mat. Med.* p. 41. Pavia, 1817.

degree all the peculiar properties of the gum-resin, having an intense odour, and hot acrid taste. It contains sulphur in its composition, and disengages sulphuretted hydrogen when kept, or by boiling. It seems, from the experiments of Dr. H. Hlasiwetz, to be some sulphuret, or a mixture of sulphurets, of a compound $C_{12}\,H_{11}$,—as $\{C_{12}\,H_{11}\,S_2\} + \{C_{12}\,H_{11}\}$ S for one oil; $C_{12}\,H_{11}\,S_2 + 2\,\{C_{12}\,H_{11}\,S\}$ for another. Oil of mustard has been obtained from the assafœtida oil, by the decomposition of some of the mercurial compounds of the latter oil.

Medical properties and uses.—This gum-resin is an excitant, antispasmodic, expectorant, emmenagogue, and anthelmintic. It was used by Hippocrates under the name of Laserpitium. It was also employed by Dioscorides, chiefly as a expectorant.[1] It is more efficacious than any of the other fœtid gums, producing its effects in a shorter space of time; and is therefore beneficially given as an antispasmodic in cases of hysteria, hypochondriasis, dyspepsia, flatulent colic, the flatulence of hypochondriasis, tympanitis, and in nervous diseases: its expectorant powers have been found useful in asthma and hooping-cough, after all inflammatory symptoms have disappeared; and it ranks high as a remedy in chlorotic affections. We are informed that in India it is a successful native specific against the Guinea[2] worm. Its use is contra-indicated when the inflammatory diathesis is present; and, owing to its stimulant quality, it is often combined with antimonials and nitre. It is used locally, in the form of enema, in worm cases, flatulent colic, and in the convulsions attending dentition; and sometimes it is applied as a plaster for discussing tumours.

The dose is from grs. x. to j. formed into pills, or diffused in water. Owing to its nauseous character it is best administered in the form of pills. Six drachms of assafœtida beaten with ʒ ss. of camphor forms a proper mass for a plaster.

Officinal preparations.—*Assafœtidæ preparata*, L. *Enema Assafœtidæ*, L. *Tinctura Assafœtidæ*, L. E. D. *Pilulæ Assafœtidæ*, E. *Pilulæ Assafœtidæ compositæ*, D. *Pilulæ Aloes et Assafœtidæ*, E. *Emplastrum Assafœtidæ*, E. It is contained in several other officinal preparations, as *Pil. Galban. C.*, *Spt. Ammoniæ Fœtidus*, *Enema Fœtidum*, &c.

FICUS. *Spec. Plant. Willd.* iv. 1131.

Cl. 23. *Ord.* 2. Polygamia Diœcia. *Nat. ord.* Urticaceæ.

G. 1931. *Common receptacle* turbinate, fleshy, converging, concealing the florets, either in the same or a distant individual.

Male. *Calyx* three-parted. *Corolla* 0. *Stamens* three.

Female. *Calyx* five-parted. *Corolla* 0. *Pistil* one. *Seeds* covered by a permanent, closed, somewhat fleshy calyx.

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[1] It is used as a condiment in Persia; and by the Brahmins in India.

[2] *Edin. Med. Journ.* ii. 304.

* *Leaves lobed.*

Species 1. F. *Carica.*[1] The Fig-tree. *Med. Bot. 3d edit.* 714. *t.* 244. *Hayne,* ix. 13.

Officinal. FICUS, *Lond. Edin. Dub.* The preserved fruit of the Ficus Carica. The Fig.

Syn. Figue (*F.*), Feige (*G.*), Vyge (*Dutch*), Figen (*Dan.*), Fikon (*Swed.*), Fico (*I.*), Higo (*S.*), Figos (*Port.*), Smokovnitsa (*Russ.*), Sirnie Attil pullum (*Tam.*), Unjeer (*Pers.*), El Kermos (*A.*).

The fig-tree is a native of Asia; but it was introduced into Europe in the early ages. It flourishes in France, Spain, and Italy, and even sometimes ripens its fruit in England.[2] It flowers in June and July. It seldom rises above twelve feet in height; it sends off many spreading branches: and the trunk, which exudes a milky, odorous fluid when wounded, is covered with an ash-coloured bark, and seldom exceeds seven inches in diameter. The leaves, which are annual in Europe, but perennial between the tropics, are large, nearly a span in length, scabrous, and irregularly divided into three or five lobes: of a deep green colour on the upper surface, with a pale green longitudinal vein to each lobe: but on the under surface the whole is pale green, with the veins raised, reticulated, and downy: they are supported on round petioles. The fruit in its early stage serves as a common receptacle, and contains upon its inner surface both the male and female florets. It is turbinate, umbilicate at the top, in colour varied green and red, fleshy, soft, hollow within, and containing numerous achenia.[3]

The fig-tree was very much cultivated by the ancients, who brought the fruit to perfection by a process which they termed caprification. They had observed that those figs which were perforated by an insect, the Cynips *Psenes* of Linnæus, always ripened better; and therefore they tied a wild fig, on which this insect breeds, near the young cultivated figs, so as to cause the insects, when they issued from the wild figs, also to perforate the cultivated. The good effects arose from the crawling of the larvæ within the figs, scattering the pollen, and thus forwarding the impregnation of the female florets. Thus the gardeners of Aleppo, ignorant of the cause of the benefit derived from the Cynips, imitate the process by pricking the figs with a needle dipped in oil, in order to procure early figs. The fruit when ripe is dried in ovens, to preserve it, and to destroy any of the larvæ of the Cynips that may

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[1] Συκη of the Greeks, who termed the fruit Συκα.

[2] The first fig-trees introduced into England are still in the Archbishop's garden at Lambeth. They are supposed to have been planted by Cardinal Pole, and now bear excellent fruit. In the neighbourhood of Worthing, and some other places, figs are ripened in the open air, on standard trees.

[3] *Gærtner de Fructibus,* ii. 66. t. 91.

remain; and then packed very closely in the small drums and baskets in which they are imported into this country.[1]

Qualities. — Dried figs have a sweet, peculiar taste. They are generally compressed: the cuticle is of a brownish colour, and crusted over with crystals of sugar; and within are numerous small yellow lenticular seeds or achenia, in a sweet viscid pulp. The sweetness of the fruit is due to grape sugar: they also contain much mucilage. According to M. Bley[2], they consist of 62·5 parts of *sugar,* 0·9 of *fat,* 0·4 *extractive,* &c., 5·2 of *gum* and *phosphoric acid,* 15·0 of *lignin* and *achenia,* 16·0 *water* = 100.

Medical properties and uses. — The dietetical use of figs is well known.[3] When eaten freely, they are apt to occasion flatulent colic and diarrhœa. They are used medicinally, in demulcent decoctions, in pulmonary and other inflammatory complaints; and two ounces of them boiled in six fluid ounces of water, and strained, form a useful gargle in cynanche tonsillaris, when suppuration takes place. The figs themselves, roasted or boiled and split, form excellent cataplasms, when applied very hot to gum-boils, buboes, and other phlegmons.[4] Figs are contained in the *Decoctum Hordei compositum* and the *Confectio Sennæ.*

FILIX. *See Aspidium.*

FŒNICULUM. *De Candolle's Prodromus,* pars iv. p. 142.

Cl. 5. *Ord.* 2. Pentandria Digynia, *L.* *Nat. ord.* Umbelliferæ.
Species 1. F. *vulgare.* Common Fennel.
2. F. *Officinale,* F. *Dulce,* Sweet Fennel.
Officinal. FŒNICULUM, *Lond. Edin. Dub.* The seed (fruit) of Sweet Fennel.

Syn. Fenouil ou Anis douce (*F.*), Fenchelsamen (*G.*), Venkel (*Dutch*), Fennikel (*Dan.*), Fënkol (*Swed.*), Kopo Wlosky (*Pol.*), Eneldo hinojo (*S.*), Finocchio (*I.*), Hinojo (*S.*), Funcho (*Port.*), Ukrop Voloschkoi (*Russ.*), Razecanuj (*Arab.*), Badeeyan (*Pers.*), Perun-siragam (*Tam.*), Mayuri (*Hind.*), Adas (*Jav.*).

Common Fennel is a biennial plant, originally found in the south of Europe only, and flowering in July and August. But the fruit of the Fennel in the shops is that of F. *officinale.* The root is fusiform, elevating a stem about two feet in height, erect, branching, leafy, striated, and smooth. The leaves are triply pinnate, composed of long, smooth, depending, capillary leaflets, of a

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[1] The most luscious died figs in the world are those of Kalamata in the Morea. They are dried upon rushes, with which the figs are pierced.

[2] *Zenker's Naturg. der vorzügl. Handelsp.*

[3] Figs were the chief part of the food of the ancient Athletæ.

[4] The most ancient cataplasm on record was made of figs. It was used for the relief of Hezekiah, who lived 260 years before Hippocrates. "And Isaiah said, Take a lump of figs. And they took and laid it on the boil, and he recovered." — 2 Kings, chap. xx. 7.

very deep green colour. The flowers are in terminal umbels; consisting of from 6 to 8 rays without bracts: there is no *calyx*, the *petals* are five, ovate, emarginate, with their points turned inward, and of a golden yellow colour: the fruit is ovate, but narrow, very little compressed, on the contrary, the ridges are sharp: the fruit is of a brownish olive colour when ripe, three-ribbed, and encircled with a membranous margin.

There are two species of fennel; the root of the *common fennel*, and the fruit of the F. *dulce*, the *sweet fennel:* the latter is that which is used. The roots found in the shops are the produce of our own country, those of F. *vulgare*, and are taken up in the spring; but the fruit, or, as it is termed, seed, is generally imported from France: the root is not now officinal.

Qualities.—The roots are covered with a brown bark, are woody and white within, have scarcely any odour, and only a slightly sweetish taste, with very little aromatic warmth; but the fruit has a fragrant odour, and a sweet, warm, aromatic taste. These qualities depend on a volatile oil, which is dissipated by decoction in water, and separated by distillation; they are completely imparted to alcohol, but only imperfectly to boiling water by infusion. The fruit contains also a fixed inodorous, insipid oil. The *oil of fennel* usually employed is obtained from the fruit of F. *dulce:* it is more agreeable both in odour and taste than that of F. *vulgare*. Nineteen cwts. of the fruit yield 78 lbs. of the oil.

Medical properties and uses.—Fennel was formerly esteemed as a remedy: and supposed to be resolvent, diuretic, carminative, and stomachic; but even as a carminative it is not superior to aniseseed and caraway; and it is therefore now seldom employed. The dose of the bruised fruit may be from ℈j. to ʒj.

Officinal preparations.—*Aqua Fœniculi*, E. D. *Oleum Seminum Fœniculi*, E. D. *Essentia Fœniculi*, D.

FŒNICULI OLEUM. *Lond.* See Part III.

FRAXINUS. *Spec. Plant. Willd.* iv. 1102.

Cl. 23. *Ord.* 2. Polygamia Diœcia. *Nat. ord.* Oleaceæ.
G. 1903. Hermaph. *Calyx* 0, or four-parted. *Corolla* 0, or four-parted. *Stamens* two. *Pistil* one. *Capsule* one-seeded, lanceolate. Female. *Pistil* one, lanceolate.
Species 15. F. *Ornus*[1] (Ornus *Europea*). Flowering Ash. *Med. Bot.* 3*d edit.* p. 589. *Sibthorp*, *Flora Græca*, *t.* 4. *Hayne* xiii. 11.
Officinal. MANNA, *Lond. Edin. Dub.* Manna. Concretion from Fraxinus Rotundifolia and Fraxinus Ornus, *L.*; from several species of Fraxinus and Ornus, *E.*; from Fraxinus Ornus and other species, *D.*

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[1] Μελια Dioscoridis.

Syn. Manne (*F.*), Mannaesche (*G.*), Manna (*Russ.*), Manna (*I.*), Mana (*S.*), Terinjebin (*Arab.*), Shirkhisht (*H.*), Disu Baedak (*Turkish*).

This tree is a native of the south of Europe, growing abundantly in Calabria, Apulia, Sicily, on Mount Parnassus, and the loftier mountains of Greece; and is cultivated in England as an ornamental tree; flowering in May and June. It seldom exceeds twenty feet in height, is very branching, and has a smooth grey bark. The leaves are deciduous, petiolate, opposite, and pinnate; composed of two or three pairs of leaflets, with a terminal one: the leaflets are one inch and a half long and three fourths of an inch broad, acuminate, serrated, smooth, and of a deep bright green colour. The foot-stalks vary in length, and are channelled with stipules; the gems are villous. The flowers are white and fragrant, and grow in close panicles, and at the extremities of the young shoots. They are pedicellated, opposite, and corollated. The segments of the calyx are ovate, pointed, and nearly equal: the petals oblong and linear, obtuse, entire, attenuated at the base, spreading, twice the length of the calyx. The filaments are two, spreading, white, smooth, and bearing yellow incumbent anthers. The germen is small, oval and smooth, with a short straight style, crowned with a notched stigma. The capsules droop, are lanceolate, notched, compressed, and bilocular at the base; with one cell generally abortive, while the other contains a cylindrical ferruginous seed.

Several other species of ash, namely, the *rotundifolia*[1], *excelsior*, *parviflora*, *subrufescens*, and *lentiscifolia*, are said, also, to produce manna.[2] It exudes in warm dry weather spontaneously from the stem and branches, it is said, from punctures made by the Tettigonia *Orni:* it flows out nearly colourless, and concretes into whitish tears, which are scraped off and sold under the name of manna in the tear. The greater part of the manna, however, is obtained by longitudinal incisions about three inches in length, made on one side of the tree only in the same season, and continued from the base of the trunk upwards as far as the branches, at the distance of an inch from each other. The manna flows at first in the form of a thick juice, which gradually concretes: it is

[1] It will be seen that the London College now refers manna to Fraxinus Rotundifolia, as well as Fraxinus Ornus.

[2] A substance resembling manna is also produced from the Tamarisk, and used as food by the Bedouin Arabs in the region of Mount Sinai: but Mitscherlich asserts that it contains no mannite. Burckhardt says, "Whenever the rains have been plentiful during winter, it drops abundantly. They gather it before sunrise, because if left in the sun it melts: they use it as we do sugar, principally in their dishes composed of flour."—*Travels in Nubia*, 4to. 1819. Introd. p. lxviii. Dr. Royle informs us that there are four kinds of manna known in India:—1. called *Sheerkhist*, procured in Khorasan; 2. *Torunjbeen*, the production of Alhagi *Maurarum* of De Candolle; 3. *Guzunjben*, from a tamarisk; 4. *Shukhrcol-askur* from Calotropis *procera*; and 5. from an umbelliferous plant.

collected on leaves or twigs, and forms the irregular stalactitic masses known under the name of *flake* manna. By making the juice to concrete on straws fastened near the incisions, a finer kind of manna is procured, which is called canulated manna, *manna in cannoli.* In Sicily this variety is received on the leaves of the prickly pear, *Cactus Opuntia.* The collecting begins about the end of June, and terminates in September.[1] A third kind called fat manna, *manna grassa,* flows from the tree in October and November, and owing to the rains runs to the ground, and contains many impurities.

Manna is brought to Great Britain from Palermo chiefly, but occasionally from Leghorn, Trieste, Malta, and many other places. It is packed in chests. The different sorts are in separate packages, and are known by the names of *Flake* manna, *Tolpha* manna, *Sicilian* manna[2], and *Calabrian* manna. The best is "in oblong pieces or flakes, moderately dry, friable, light, of a whitish or pale yellow colour, and in some degree transparent: the Tolpha is smaller and more broken; the inferior kinds are moist, unctuous, and brown."[3] The best flake manna bears the impression of the branch on which it had concreted on its inner surface. Manna is said to be occasionally counterfeited by a composition of honey or sugar, mixed with scammony or some other purgative[4]: but such frauds are now seldom attempted; and bad or counterfeit manna may be easily discovered by its colour, weight, transparency, and taste, which are different from those of real manna.

Qualities.—Manna has a slight peculiar odour, and a sweet but not agreeable taste, with some degree of bitterness, leaving a slight acrid impression on the palate. The finer pieces, which are often hollow, when broken and examined by a good lens, exhibit bundles of long beautiful spicular crystals; but the general texture of the pieces is granular. Manna is entirely soluble in water and alcohol: but the latter, when the solution has been made by heat, deposits on cooling five eighths of a beautifully white inodorous crystallized matter, which was formerly regarded as pure manna, but which is now ascertained to be a peculiar saccharine principle, which has been named *Mannite;* whilst an uncrystallizable, mucilaginous, acrid extract remains, on which probably the purgative property of the drug depends. Fourcroy and Vauquelin suppose that the common manna of the shops contains four different ingredients:—1. Pure manna, constituting three fourths of the whole; 2. A little common sugar; 3. A yellow nauseous smelling substance, to which

[1] Arctuarius is the first Greek who notices manna.—*Friend's Hist. of Med.* i. 271.

[2] The greatest produce of Sicilian manna is in the neighbourhood of Castellamare, Carini, Cefalu, and Caronia, where it yields an annual revenue of 40,000*l.* sterling.—*Smyth's Sicily and its Islands.* 4to. 1824, p. 14.

[3] *Lewis.*

[4] *Alston's Mat. Med.* ii. 472.

its purgative qualities seem owing; and 4. Mucilage. But it is to Proust, Thénard, and Bouillon, La Grange, and Bucholz, that we are indebted for a knowledge of the chemical composition of manna. According to Thénard's analysis it consists of *mannite*, a small proportion of *pure sugar*, and the *nauseous uncrystallizable mucus*, on which the active virtues of the drug depends.[1] Bucholz states its components to be 60·0 of *mannite*; 5·5 *uncrystallizable sugar* with *colouring matter*; 1·5 *sweetish gum*; 0·8 *gummy extractive*; 0·2 *fibro-glutinous matter*; 32 *water* and *loss* = 100·0.[2] The Mannite differs from sugar, in being incapable of undergoing the vinous fermentation: according to Liebig it is a compound of 39·85 of *carbon*, 7·71 *hydrogen*, and 52·4 *oxygen* = 100·00: or $C_6\,H_7\,O_6$.

Medical properties and uses. — Manna is a very gentle laxative.[3] It was extravagantly commended by some of the older physicians; but is now more justly regarded as a laxative fit for children only, and persons of very weak habits. When given in a dose sufficient for an adult, it is apt to occasion flatulence and griping; and therefore it is seldom used except as an adjunct to senna, rhubarb, or solutions of neutral salts, with the view of covering their tastes.

The dose for children is from ʒj. to ʒiv.; and for adults from ℥j. to ℥ij.

GALBANUM.[4] *Don, Trans. of Linnean Soc.*, vol. xvii. 603. *Nat. ord.* Umbelliferæ.

Species. G. *officinale.* *Opoidia Galbanifera* (Lindley).
Officinal. GALBANUM, *Lond. Edin. Dub.* Galbanum. Supposed to be gum-resin from Opoidia Galbanifera.

Syn. Galbanum (*F. Swed. Dan. Dutch*), Mutterharz (*G.*), Galbano (*I.*), Galbáno (*S. Port.*), Galban (*Russ.*), Bārzud (*A.*), Bireejā (*H.*), Beerzud (*Pers.*).

The late professor Don has advanced reasons for thinking that galbanum is the production of a plant allied to the genus Siler. He proposed to call it Galbanum *officinale*, an opinion adopted by the London College; but which requires confirmation. The plant yielding it is a native of Persia, and belongs to the natural order Umbelliferæ.

The gum-resin is brought to this country from the Levant, in cases or chests, containing from one to two hundred weight each. The best is in tears, but more commonly it is in mass, lump galbanum, composed of distinct whitish tears agglutinated together by a pale brown or yellowish substance. It is sometimes much mixed with stalks, seeds, and other impurities. The tears are justly considered to be the best part of the mass. The separate tears are

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[1] *Ann. de Chim.* t. lix. p. 51.
[2] *Gmelin, Handb. d. Chim.* ii. 1295.
[3] It is nutritive, and is used as food by the gatherers during its collection.
[4] Χαλβανη Dioscoridis.

rare; they seldom exceed a large pea in size, are brownish yellow, irregularly globular, softish, tough, and somewhat translucent: the masses are composed of tears agglutinated together, more opaque and of a darker hue than the separate tears. When the colour is dark brown or blackish, it must be rejected as bad.

Qualities. — Galbanum has a strong peculiar odour, slightly resembling that of turpentine; and a bitterish, warm, acrid taste. Its specific gravity is 1·212.[1] It softens but does not melt when heated; it burns with a white flame. When triturated with water, about one fourth of its weight is dissolved, forming a milky solution; but, after standing for a little time, much is again deposited, and what remains undissolved by the trituration is, exclusive of the impurities, almost completely soluble in alcohol. Wine and vinegar act on it nearly in the same manner as water. Alcohol takes up one fifth of its weight; and a yellow tincture is produced, which has the sensible qualities of the galbanum, and becomes milky on the addition of water; but there is no precipitate. Proof spirit acts slowly on it, and dissolves the whole, the impurities excepted. Sulphuric ether dissolves a considerable portion of galbanum, forming a bright golden-coloured tincture, which, when evaporated alone, or floating on the surface of water, leaves a yellow, tenacious resin, that retains in perfection the sensible qualities of the galbanum. The part insoluble in ether is nearly wholly soluble in water. Chlorine, added to the solutions of galbanum, throws down an insoluble matter which appears to be extractive. By distillation the gum-resin "yields half its weight of volatile oil, which has at first a blue colour."[2] From my experiments, galbanum appears to consist of *resin, volatile oil, gum,* and *extractive;* but according to Meissner, its components are 65·8 of *resin,* 22·6 *gum,* 1·8 *bassorin,* 3·2 *volatile oil,* 0·2 *malic acid,* and 6·2 *water* and *impurities* = 100·0.[3]

Medical properties and uses. — Galbanum is stimulant, antispasmodic, expectorant, and deobstruent; and may be placed between ammoniacum and assafœtida. It has been found useful in hysteria, particularly when attendant on difficult menstruation; in chlorosis, humoral asthma, and chronic rheumatism. Externally it is applied as a resolvent and a stimulating suppurative to indolent tumours.

The dose is from grs. x. to ʒ ss. in pills; or triturated with water and gum-arabic, so as to form an emulsion.

Officinal preparations. — *Galbanum preparatum,* L. *Pilulæ Galbani comp.* L. *Emplastrum Galbani,* L.

GALIPEA. *Plantæ Equinoctiales,* tom. ii. p. 5.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Rutaceæ.

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1 *Brisson.*

2 *Thomson's Chymistry,* 4th edit. v. 142.

3 *Schwartze, Pharm. Tabel.* 284, 2 *Ausg.*

Gen. Char. *Calyx* monophyllous, campanulate, five-toothed. *Corolla* five petals cohering near the base, funnel-shaped.

Species 1. G. *Cusparia officinalis.* Three-leaved Bonplandia. *De Candolle, Humboldt,* l. c. tab. 97. *Mém. de l'Institut,* 184. Part I. p. 82. pl. 10. *Hayne,* i. 18.

Officinal. CUSPARIA, *Lond. Edin.* Bark of Galipea Cusparia, or Galipea officinalis. Angustura bark.

Syn. Angusture (*F.*), Angustura-rinde (*G.*), Angustura (*Dan. Swed. I.*).

There is reason to believe that M. Auguste Saint Hilaire is correct in regarding the tree which yields the Cusparia bark as a Galipea. The London College has adopted the specific name *Cusparia,* given to it by St. Hilaire; but Dr. Hancock says that it is a distinct species, which he has named C. *officinalis.* [1]

This tree is a native of South America, growing abundantly in the woods five or six leagues from the eastern bank of the Carony, at the foot of the hills that surround the missions of Capassui, Upata, and Alta Græcia. It grows also west of Cumana, in the Gulf of Santa Fé; and, as Humboldt remarks, may become an article of export from New Andalusia. It is an elegant evergreen, having a cylindrical *trunk,* covered with a grey-coloured bark, and branching towards the summit. The branches are alternate, the upper ones spreading nearly horizontally. The *leaves,* which are ranged alternately on the branches, are about two feet long, independent of the petiole, and composed of three elegant oblong-ovate leaflets, pointed at each extremity, and attached at their bases to a single channelled petiole, from ten to twelve inches in length. The *leaflets* are glandular, and, when fresh, exhale an agreeable aromatic odour. The *inflorescence* is a terminal raceme, composed of alternate peduncles, bearing from three to six flowers each: the calyx is inferior, persistent, five-toothed, and tomentose; the corolla is funnel-shaped, and composed of five petals, so united below as to appear as one tube, with a five-cleft spreading tube. The *nectary* consists of five glandular bodies. The *stamens,* which are shorter than the petals, have white filaments supporting oblong yellow antlers; the *pistil* is formed of five oval hairy ovaries, from the centre of which a single style rises, supporting five fleshy green stigmata. The *fruit* consists of five oval bivalve capsules, each enclosing a single seed. According to Dr. Hancock the height of the tree seldom exceeds twenty feet; indeed, the appearance of the bark indicates a small tree. The first parcels of Cusparia bark were imported from Dominica in 1778, and the tree yielding it was supposed to be a native of Africa [2]; but importations from

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[1] *Med. Bot. Trans.* 1829.

[2] See *Brande's Experiments and Observations on the Angustura Bark, a name* which it received only because it came from *Nueva Guayana,* or *Angustura.*

Cadiz and the Havannah, and the travels of Humboldt and Bonpland, have led to the knowledge of the real place of its growth. It is brought to this country chiefly from Nassau and Carthagena, packed in casks; but the original package, as Mr. Brande, senior, who first wrote on the subject, informs us, is curiously made of the large leaves of a species of palm, surrounded by a kind of network of sticks. The bark is in pieces of different lengths, some nearly flat, and others in partial quills of all sizes intermixed. The pieces are covered with a whitish, wrinkled, thin epidermis; the inner surface is smooth, of a brownish-yellow colour, and the intermediate substance mottled-fawn colour, and of a compact texture.

Qualities. — The odour of this bark is not strong, but peculiar: the taste is bitter, slightly aromatic and permanent, leaving a sense of heat and pungency in the throat. The pieces break with a close, short, resinous fracture, are easily pulverized, and afford a powder which, when triturated with lime or calcined magnesia, gives out ammonia. The active matter is taken up by cold and hot water in infusion, and is not injured even by coction. The alcoholic tincture reddens litmus paper, and becomes milky on the addition of water. The watery infusion precipitates the infusion of galls, and that of yellow cinchona, but not gelatine.[1] I found that it precipitates sulphate of iron, tartarized antimony, diacetate and acetate of lead, bichloride of mercury, and pure potassa. Nitrate of silver also precipitates it yellow, but assumes a violet colour after a short time. Sulphate and ammonio-sulphate of copper precipitate it green. Ammonia deepens the colour, but does not precipitate it. Sulphuric acid gives the infusion a brown colour, and gradually a lemon-yellow precipitate is deposited; whilst nitric acid deepens the colour to a blood red, and after some time affords a lemon-yellow precipitate. The hydrochloric acid does not affect it. Sulphuric ether takes up one part from ten of the powder, and when evaporated on water leaves a greenish yellow very acrid resin, and renders the water milky: the addition of nitro-hydrochloric acid changes this milky appearance to red, slowly producing a lemon-yellow coloured precipitate, and giving the resin on the side of the glass a brownish-pink colour. By distillation with water, the bark yields a small portion of a white volatile oil. These experiments ascertain the substances which are incompatible in prescriptions with infusion or tincture of cusparia bark; and show that it contains *resin*, a peculiar variety of bitter *extractive*, *carbonate of ammonia*, *volatile oil*, and *igasauric acid*, which I was inclined to think was in combination with *cinchonia*[2]: but Saladin has investigated the

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[1] Vauquelin. *Annales de Chimie*, lix. 130.

[2] A species of bark, in some respects resembling the Cusparia, has lately been intro-

subject, and asserts that it is a new alkali, which he has termed *Cusparin.* According to the analysis of Pfaff[1] the constituents of Cusparia are *volatile oil*, *bitter extractive*, *bitter resin*, *acrid oily resin*, free *tartaric acid*, *sulphate* and *tartrate of potassa*, *chloride of potassium*, and *sulphate of iron.* The Cusparin of Saladin is readily procured by acting upon the infusion of Cusparia bark with absolute alcohol, and leaving it to spontaneous evaporation. The crystals procured are four-sided, they melt at a low temperature, and lose 23·09 per cent. of their weight. Water at 60° dissolves only ½ per cent., at 212° 1 per cent. They are more soluble in alcohol, and they dissolve in acids and in alkalies, and are precipitated by infusion of galls.[2]

Medical properties and uses. — Cusparia bark is stimulant and tonic. It was introduced in the West Indies with very high pretensions; and although it is not superior or even equal to cinchona bark in intermittent fevers, yet it is a remedy possessed of very considerable powers. It does not oppress the stomach, but gives to it a degree of warmth, expels flatus, keeps the bowels open, and increases the appetite for food. It is particularly efficacious in bilious diarrhœa and dysentery, after due evacuations; and also proves useful in dyspepsia, hysteria, leucorrhœa, and most of the diseases in which the use of a general tonic is indicated. Mr. Brande, senior, published several cases which came under his own observation, and some from the communications of others, in which its usefulness, as a remedy for intermittents, appears to be confirmed; but this is disputed, particularly by Alibert, who gave it a fair trial in the hospital of St. Louis. My own experience does not enable me to give an opinion respecting its utility in ague; but I have had ample proof of its value as a general aromatic tonic. Its employment is contra-indicated in directly inflammatory complaints, in hectic fever, and colliquative diarrhœa.

It may be exhibited in powder, in watery infusion, in tincture, and in the form of an aqueous extract. The powdered bark is

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duced into the Continent, possessing the most deleterious quality. Plamba has examined it, and named it Angustura *ferruginea.* It is readily distinguished from the true bark, by its greater thickness and weight, and the epidermis being of a brownish olive hue, and warty, and devoid of the lichen named *Myriotrema.* It impresses also the most nauseous and permanent bitter when chewed. By agitating the powder in very dilute hydrochloric acid, and then testing with ferrocyanide of potassium, the infusion assumes a beautiful green, changing to blue, owing to the iron contained in the cuticle of this bark. The narcotic deleterious matter has been ascertained to be *Brucia* or *Strychina.* For particulars regarding its poisonous properties, vide *Orfila's Traité des Poisons*, tom. ii. p. 331., and *The Lond. Med. Repository;* and for the characters of Brucia, vide *Ann. de Chim. et Phys.* xii. 113. This bark is supposed to be that of the Strychnos *nux vomica;* and there is no doubt that the East Indian Angustura is that bark; but there is a bark, which comes home mixed with the real Cusparia, the origin of which is yet unknown.

[1] *Syst. der Mat. Med.* ii. 58.

[2] Jahresbericht, 1835.

given in doses of from grs. x. to ʒ ss., beyond which it is apt to induce nausea. It may be combined with rhubarb, neutral salts, magnesia, and testaceous medicines; or with powdered cinnamon, which covers its nauseous taste better than any other adjunct. Of the aqueous extract, grs. x. is a full dose. In large doses all the forms are apt to excite nausea.

Officinal preparations. — *Infusum Cuspariæ*, L. E. *Tinctura Cuspariæ*, E.

GALLÆ. See *Quercus*.

GENTIANA.[1] *Spec. Plant. Willd.* i. 1331.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Gentianaceæ.
G. 512. *Corolla* one-petalled. *Capsule* two-valved, one-celled; with two longitudinal receptacles.
* *Corollas five or nine-cleft, somewhat bell-shaped.*
Species 1. G. *lutea.* Yellow Gentian. *Med. Bot. 3d edit.* 273. *t.* 95. *Hayne*, xiii. 28.
Officinal. Gentiana, *Lond. Edin. Dub.* Root of Gentiana lutea.

Syn. Gentiane jaune (*F.*), Gelber Enzian (*G.*), Gentiaan (*Dutch*), Entzianrod (*Dan.*), Baggsöta (*Swed.*), Sodrod (*Dan.*), Genziana (*I.*), Jenciana (*S.*), Genciana Amarella (*Port.*), Gentsiana; Goretschavka gelmaia (*Russ.*).

This species of gentian is a perennial plant, found growing on the Alps of Switzerland and Austria, the Apennines, the Pyrenees, and in North America. The root is thick, long, and cylindrical. The stem is from three to six feet high, herbaceous, hollow. The lower leaves are petiolate, large, spear-shaped, stiff, plaited, having five large veins on the back, and of a yellowish green colour; those of the stem are concave, smooth, and egg-shaped, sessile, and almost embracing the stem. The flowers are in whorls at the upper joints, large, yellow, peduncled, and beautiful: the calyx, which is a membranous deciduous spathe, bursts on the side when the flower opens: the corolla is rotated, divided into five or eight narrow spreading segments, elliptical and speckled with many thick dots. The filaments are shorter than the corolla, and furnished with long erect anthers: the germen is conical, crowned with two sessile reflected stigmas; and it becomes a conical capsule, which contains numerous small seeds.

Gentian roots are brought to this country from Germany. They are in pieces of various lengths and thickness, twisted, wrinkled longitudinally on the outside, and covered with a

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[1] Γεντιανη, Dioscoridis. Said to have been named after Gentius, king of Illyria, who first discovered its medicinal properties 167 years before the birth of our Saviour. Many other species of the gentian, as well as the G. *lutea*, possess the same medicinal properties; namely, G. *biloba*, G. *punctata*, G. *Macrophylla*, and G. *Catesbaci.* The G. *Chirayita* is now much used as a stomachic bitter in this country.

brownish, dull, orange-coloured cuticle. Although tough and flexible, they are easily powdered, and yield a yellow-brown powder.

Qualities. — Gentian has no particular odour: the taste is intensely bitter without being nauseous. When cut transversely, the pieces exhibit a yellow maculated heart, with thick bark verging to brown. Its sensible qualities are extracted by ether, alcohol, and water. The two former extract a resin and a bitter extractive matter; and the latter, some part of these and a considerable quantity of mucilage also, which occasions the infusion often to become ropy. Diluted alcohol is its proper menstruum. In the *bitter extractive* the virtues of the drug seem to reside. According to the analysis of MM. Henry, senior, and Caventou, Gentian contains an *odorous very fleeting principle;* a *yellow bitter principle,* which they named *gentianin;* a *substance resembling bird-lime;* a *greenish oily matter;* a *free organic acid;* a *saccharine principle; gum;* a *tawny colouring matter;* and *woody fibre.*[1] The *Gentianin* is extracted by ether, and the ethereal extract acted upon by alcohol: it was supposed to be the active principle of the plant: it is in golden-yellow crystals, scarcely soluble in cold water, but very soluble in alcohol and ether[2]; it has an acid reaction, and forms with alkaline bases golden-yellow crystallizable salts; it is termed *Gentisic acid,* by Lecomte. When pure, the Gentianine of MM. Henry and Caventou has been shown to be devoid of bitterness and inert. The bitter principle has been named *Gentianite.*[3]

Medical properties and uses. — Gentian-root is tonic, stomachic, and in large doses aperient. Its bitter principle enters the circulation, and gives both the urine and the perspiration a bitter taste. Its use as a stomachic bitter is of a very ancient date: and it is still, perhaps, the most generally employed of this class of medicines. It has been found beneficial in dyspepsia, gout, hysteria, and jaundice, chlorosis, dropsy, and diarrhœa; and in all cases of general debility in which tonics are indicated. It is sometimes joined with cinchona in intermittents; and, according as the circumstances of the cases for which it is prescribed direct, it may

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[1] *Journ. de Physique,* vol. lxxxiv. p. 245.

[2] To obtain gentianin, macerate the root in ether, decant and evaporate the tincture, treat the residue with alcohol, and evaporate the alcoholic solution; then treat the residue again with alcohol, and leave the filtered solution to crystallize. To obtain it quite pure, boil the impure crystals in water with calcined magnesia, and submit the mass to the action of ether; the ethereal solution gives crystals of pure gentianin, or gentisic acid.

[3] Gentianite is procured by acting with water on an alcoholic extract of gentian, precipitating the solution by acetate of lead; and removing any excess of the salt of lead by passing a stream of sulphuretted hydrogen through it. The extract left by evaporation is then to be acted on by ether to remove some fatty matter and wax. The bitter principle, gentianite, remains.

be combined with orange-peel, chalybeates, aromatics, squill, mineral acids, and neutral salts. On account of its antiseptic effects on dead animal matter, its infusion has been used as an application to putrid ulcers. Opinions vary as to its exerting any poisonous influence: if it exerts any it must be very slight. The forms in which it is generally given are infusion and tincture.

The dose in substance is from grs. x. to ℈ ij.

Officinal preparations. — *Extractum Gentianæ,* L. E. D. *Infusum Gentianæ compositum,* L. D. *Infusum Gentianæ,* E. *Mistura Gentianæ, composita,* L. *Tinctura Gentianæ composita,* L. E. D. *Vinum Gentianæ,* E.[1]

GLYCERINA, *Dub.* Glycerine. A sweet principle produced during saponification.

This substance is obtained when any of the readily saponifiable fatty bodies are submitted to the action of an alkali or base: it passes off with the ley of the soap process. It is usually prepared during the formation of lead plaster; and a process for procuring it is given in the United States Pharmacopœia, as follows: — "Take of lead plaster recently prepared and yet fluid, boiling water, each a gallon; mix them; stir briskly for fifteen minutes; then allow them to cool; and pour off the supernatant liquid. Evaporate this until it has the specific gravity of 1150, and pass a current of sulpho-hydric acid (sulphurettedhydrogen) slowly through it, until a black precipitate is no longer produced; filter, and boil until the sulpho-hydric acid is no longer driven off; lastly, evaporate the liquid until it ceases to lose weight."

Fatty bodies, either vegetable or animal, consist usually of two distinct principles, one fluid, the other solid; the first called oleine, the second either stearine or margarine, &c. All these substances can be resolved, by the action of an alkali, into an acid, which unites with the base; and, at the same time, *glycerine* is separated: yet it is not probable that the fat itself consists simply of the fatty acids united with glycerine, but it would rather appear that this sweet principle is a product resulting from the breaking up of the fatty principles. In the process for making the Emplastrum Plumbi, the litharge (protoxide of lead) acts upon the margarine and oleine of the oil, and thus are formed margarate and oleate of lead (lead plaster); and glycerine is liberated and dissolves in the water which is employed. By the use of sulphuretted hydrogen, any excess of lead is removed from the fluid, and by evaporation,

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[1] Dr. Paris (*Pharmacologia*) says, that the quack medicine known under the name of *Brodum's Nervous Cordial* consists of the tinctures of *gentian, colomba, cardamom,* and *bark,* with the compound spirit of *lavender* and *wine of iron;* and *Stoughton's Elixir,* of tincture of *gentian,* with the addition of *serpentaria, orange-peel, cardamoms,* and some other aromatics.

the water in which the glycerine is dissolved, is driven off, and the sweet principle alone remains.

Qualities. — Glycerine, when pure, occurs as a viscid, colourless fluid, much resembling syrup. According to the Dublin College, its specific gravity should be 1260. Its taste is very sweet; it is a neutral body, soluble in water, in all proportions; soluble also in alcohol, but not in ether: its watery solution does not undergo the vinous fermentation, but with yeast and warmth it gradually becomes converted into metacetonic acid; by a strong heat it is partly volatilised, partly decomposed; by the action of nitric it is converted into oxalic acid; with sulphuric, it unites and forms sulpho-glyceric acid. Its composition is represented by the formula $C_6 H_8 O_6$ or $C_6 H_7 O_5 + HO$. Glycerine should give no precipitate with sulphuretted hydrogen, showing the absence of lead, which is apt to be contained in it when prepared in the manner above described.

Medical properties and uses. — Glycerine has been employed chiefly as an external application, and its value depends on its property of remaining liquid, and not being volatile at the ordinary temperatures. When dissolved in water, and the lotion thus formed is applied to any part, the water evaporates, leaving the skin covered with a thin coating of the syrupy glycerine, by which means the surface is protected from the action of air, &c. Mr. Startin introduced it into practice for the treatment of some cutaneous diseases, as lepra, psoriasis, impetigo, porrigo, &c. It has also recently been employed in cases of deafness by Mr. T. Wakley, in place of oil.[1]

The Editor, some years since, tried its powers as an internal agent, giving it chiefly to patients in whom the use of cod-liver oil was indicated, and in about the same doses, viz. from one to four drachms. The results of his trials were such as to induce him to place but little reliance upon its efficacy: in some cases, it appeared to allay the cough of phthisical patients, but no very marked improvement could be observed to follow its use.

As an external application, glycerine may be mixed with from four to sixteen times its volume of water: it may also be added to poultices. In Pharmacy, it may be added to pill masses, to prevent their becoming hard or mouldy.

GLYCYRRHIZA.[2] *Spec. Plant. Willd.* iii. 1143.

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.
G. 1366. *Calyx* bilabiate; upper lip three-cleft, lower undivided. *Legume* ovate, compressed.

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[1] *Clinical Reports on the Use of Glycerine in the Treatment of Deafness,* by T. Wakley, F.R.C.S., &c. 1851.

[2] Γλυκυῤῥίζα Dioscoridis. The name is derived from γλυκὺς sweet, and ῥίζα, a root.

Species 4. G. *glabra.* Common liquorice. *Med. Bot. 3d edit.* 429. *t.* 152. *Hayne*, vi. 40.

Officinal. GLYCYRRHIZA, *Lond. Edin. Dub.* Recent and dried root, *L.* Root *E. D.* of Glycyrrhiza glabra. Liquorice root.

Syn. Rêglise (*F.*), Sussholz wurzel (*G.*), Zoethout (*Dutch*), Lakris (*Dan.*), Lakrits (*Swed.*), Regalizia (*I.*), Relaliz (*S.*), Alcaçuz (*Port.*), Solodkovori (*Russ.*), Lakrycya (*Pol.*), Addimodrum (*Tam.*), Bikh-mekeh (*Pers.*), Urat manis (*Malay*), Oyot manis (*Jav.*), Kanzoo (*Japanese*), Olinde (*Cing.*), Legorizia Ussulussoos (*Arab.*), Iét'himad'h (*H.*), Yastimadhuca (*San.*).

The liquorice plant is a native of the south of Europe and Syria. In Languedoc, Spain, and Sicily, it grows in such abundance as to prove the scourge of the cultivator. The greater part of what is used in Britain is the produce of its own soil by cultivation. The London market is supplied chiefly from Mitcham in Surrey.[1] It flowers in August. The root is perennial, running, when in its proper soil, a light sandy one, very deep; it is round; the thickness from that of a goose-quill to that of the thumb; long, thin, flexible; furnished with sparse fibres; covered with a brownish cuticle; internally fibrous, of a pale yellow colour, and juicy. The stem rises four or five feet in height, is herbaceous and striated, with few branches. The leaves are alternate and pinnated, consisting of four or five pairs of ovate, retuse, petiolated leaflets, with a terminal one; of a pale green colour, and clammy on the under side. The flowers are papilionaceous, in long axillary sparse spikes, of a blue or purplish colour. The calyx is persistent, tubular, and divided above: the corolla consists of an ovate, lanceolate, obtuse, erect, concave *vexillum;* two oblong, obtuse *alæ*, and a short *carina.* The filaments are ten, nine of them united at the base, bearing simple roundish anthers: the germen is short, with a tapering style and blunt stigma. The legumes are ovate, flatted, smooth, acute, one-celled, containing two or three small kidney-shaped seeds.

When liquorice root is three years old, it is dug up for use in November. "The whole roots are then washed, the fibres cut off, and the smaller roots separated from the larger ones: the former, termed the offal, are dried and ground to powder; the latter are packed up and sold to the druggists."[2]

Qualities.—This root is inodorous, and the taste sweet and mucilaginous, leaving, when it is chewed without being peeled, a slight degree of bitterness in the mouth. The powder, if good, is of a brownish yellow colour, and has a rich sweet taste, more agreeable than that of the fresh root; but it is said to be often

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[1] Very little is now grown at Godalming, where it was formerly cultivated to some extent.—Vide *Stevenson's Survey of Surrey*, p. 380. It was first cultivated in England in 1558.—*Stow.*

[2] The price of the best roots is about 3*l.* per cwt.—*Stevenson*, l. c.

sophisticated with flour, and other substances not quite so wholesome, in which case it has a fine pale-yellow colour.

The medical properties of the root depend on a saccharine matter, named *Glycyrrhizine*; which does not crystallize, neither does it ferment; it forms, with acids, sparingly soluble compounds; the root also contains much mucilage, and a crystallizable principle, *Asparagine*, identical with that obtained from asparagus, mallows &c.: water, by coction, extracts both of these principles, but alcohol only the saccharine matter. For the properties of the extract, which is imported from Spain, see Part III. According to Robiquet[1], it contains *fecula, saccharine matter, Glycion*[2] (*Glycyrrhizine*), *Asparagin*, a *resinous oil, albumen, phosphates and malates of lime and magnesia.*

Medical properties and uses. — Liquorice root is a pleasant demulcent; but on account of its bulk it is rarely used in substance.[3] The decoction of it, either alone or in combination with other mucilaginous vegetables, is often given in catarrh, and in hectic and phthisical cases. It is also admininterd in some cases of dyspepsia, to sheath the mucous membrane. The dose of the powder is from grs. x. to ʒj.; that of the decoction a cupful, frequently repeated.

Officinal preparations. — *Extractum Glycyrrhizæ*, L. E. D. *Trochisci Glycyrrhizæ*, E.

GOSSYPIUM. *Spec. Plant. Willd.* iij. 803.

Cl. 16. *Ord.* 8. Monodelphia Polyandria. *Nat. ord.* Malvaceæ.
G. 1296. *Calyx* double; the outer one trifid. *Capsule* four-celled. *Seeds* enveloped in cotton.
Species 1. G. *herbaceum.* Herbaceous Cotton. *Lamarck Encyc.* ii. p. 133. G. *arboreum. Royle's Him. Bot.* xxii. 1, 2.
Officinal. GOSSYPIUM, *Edin.* Cotton.

Syn. Coton (*F.*), Baumwolle (*G.*), Katoen (*Dutch*), Bomuld (*Dan.*), Bomull (*Swed.*), Cotone (*I.*), Algoden (*S.*), Algodao (*Port.*), Chloptschataia bumazu (*Russ.*), Kootn (*Arab.*), Poombeh (*Pers.*), Rooe (*Hind.*), Kapase; Tula (*Beng.*).

Although the Gossypium *herbaceum* is designated, by the Edinburgh College, as the plant yielding cotton, yet there is ample evidence that it is obtained from other species of the genus. The largest proportion, however, is the production of the G. herbaceum.

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[1] *Ann. de Chim.* lxxii. 143.

[2] To procure Glycyrrhizine, precipitate infusion of liquorice root with sulphuric acid, wash the precipitate, dissolve in alcohol, and neutralise with carbonate of potassa in fine powder: let the sulphate of potassa separate by rest, and evaporate the solution to dryness. Pure Glycyrrhizine is a yellow, transparent mass, sweet, soluble in water and alcohol, and combustible. It unites with alkalies; but is precipitated from its solution by some of the metallic solutions.

[3] The ancients believed that chewing the root allayed thirst: but this opinion was founded on a mistake. — *Cullen, Mat. Med.* ii. p. 407.

It is a native of the Himalayas, and also of the Andes, occupying a range in altitude from 4000 to 9000 feet. It is cultivated extensively in Asia, Africa, America, and on the shores of the Mediterranean. It is a biennial, or triennial plant, rising from two to six feet in height, branching; the young branches and leaves are usually covered with small black dots; and the leaves, which are palmate, are hoary, and glandular on the under disk. The sepals of the outer *calyx* are dentate; the inner is cup-shaped and obtusely five toothed. The *style* is simple, marked with furrows towards the apex: it bears sometimes five stigmas. The *capsules* are three celled; and vary in size, from that of a hazel nut to that of a walnut: each cell contains from three to five seeds, enveloped, in long delicate filaments, which form the cotton.[1]

Cotton, as taken from the pod and freed from the seeds, without having undergone any other preparation, is termed *Raw Cotton.* When carded and compressed, and stiffened with a very little starch, it forms wadding; and in this form it is used. The seeds, when pressed, yield a considerable quantity of fixed oil.

Qualities.—Raw Cotton is highly inflammable. It is insoluble in water, alcohol, ether, the volatile and fixed oils, weak alkaline solutions, and the vegetable acids; but it is readily dissolved by strong alkaline solutions, and the mineral acids. When cotton wool is steeped in a mixture of nitric acid, sp. gr. 1·5, and oil of vitriol, then washed with water, and dried carefully, it will be found to be converted into a substance called gun-cotton, or pyroxyline, a body possessing powerful explosive qualities.

Medical properties and uses.—Raw Cotton is more employed by the surgeon than the physician. In cases of recent burns it operates as an anodyne, allaying pain, preventing an extension of inflammation, and, consequently, preventing blistering. If wadding be used, the pieces should be split in two, in order to permit the soft cottony part to be applied next to the burn: and many layers of it are necessary. If the cotton be not applied until vesication has taken place, the blisters should be opened before applying the cotton; and this should, also, be done when it is used in pompholyx *diutinus,* in which I have seen it prove very serviceable. The innermost layer of the cotton may, perhaps, adhere, when any discharge is present, but it should not be disturbed. The theory of the beneficial influence of treating burns with cotton is not understood; but the fact is of great practical importance.

GRANATI CORTEX ET RADIX. See *Punica.*

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[1] When examined by the microscope, these filaments appear, like flat tapes or ribbons twisted upon themselves, with distant joints. The fibres of linen, under the microscope, appear as tubes tapering at the ends, and in bundles.

GUAIACUM.[1] *Spec. Plant. Willd.* ii. 538.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Zygophyllaceæ.
G. 819. *Calyx* five-parted, unequal. *Petals* five, inserted into the calyx. *Capsule* angular, three or five celled.
Species 2. G. *officinale.* Officinal Guaiacum. *Med. Bot. 3d edit.* 557. *t.* 200. *Hayne,* xii. 28.
Officinal. GUAIACI LIGNUM, ET GUAIACUM, *Lond. Edin. Dub.* The wood of Guaiacum: Guaiacum resin.

Syn. Gayac Gomme-resin de Gayac (*F.*), Gemeiner Franzosenholz, Guajakgummi (*G.*), Pokhout (*Dutch*), Franzos trace, Pockenholz (*Dan.*), Franzosenholts (*Swed.*), Pockenholz Bakant (*Russ.*), Guajaco, Gommo-resina di Guajaco (*I.*), Guayaco; pulo santo (*S.*), Guajaco (*Port.*).

This tree is a native of Jamaica, Hispaniola, and the warmer parts of America.[2] It rises forty feet in height, and is four or five in circumference, with many divided knotty branches. The bark of the trunk is of a dark grey colour, variegated with greenish or purplish specks, but that of the branches is ash-coloured, with fissures. The leaves are bijugate, consisting of two or three pairs of smooth, shining, veined, obovate, dark green leaflets, almost sessile. The flowers are in a kind of umbels, which spring from the axillæ of the leaves in the upper branches. The calyx consists of five concave, oblong, blunt, spreading, unequal, deciduous leaves; the petals are five, of a rich pale-blue colour, elliptical, concave, and spreading; the stamens are erect and villous, with yellowish hooked anthers: the ovary is oval, compressed, with a short style and simple stigma; and the capsule subturbinate, on a short pedicel, smooth, and of a pale ferruginous blue, pentagonous, with ribbed angles, and five-celled: but two or three of the cells are always abortive.[3] The seeds are solitary and angled.

All the parts of this tree possess medicinal qualities; but the wood and the peculiar substance afforded by it are the only parts used: the virtues of the wood depend altogether on the peculiar matter it contains. This is spontaneously exuded from the tree, and is erroneously called native *gum:* it concretes in tears, which are semi-pellucid and very pure; but the greater part of it is obtained by making incisions into the trunk, or, as it is termed, *jagging* the tree. This operation is performed in May: and the juice, which flows copiously, is concreted by the sun. It is also obtained by sawing the wood into billets, and boring a hole longitudinally through them; so that, when one end of a billet is laid on a fire, the guaiacum, melting, runs through the hole from the opposite end, and is collected in a calabash. Boiling the chips or raspings in salt and water also separates the guaiacum, which, as it rises to the surface, may be collected by skimming. Guaiacum is rarely imported in tears; in the mass it is frequently found

[1] The Spanish name, *Guayaco,* is derived from the Caribee.—*Humboldt.*
[2] The tree was cultivated in this country by the Duchess of Beaufort, 1699.
[3] *Gært. de Fructibus,* ii. 148. t. 113. fig. 1.

mixed with chips, the bark of the tree, and other impurities. It is brought from the West Indies; sometimes through New York, packed in barrels, boxes, and serons containing from one to four cwt.

The wood of Guaiacum, lignum vitæ, is brought to this country either in large solid pieces, which weigh from four to five cwt. each, and contains both perfect wood and a yellowish alburnum; or it is already rasped.

Qualities. — The *wood* of guaiacum is inodorous, but when heated it emits an aromatic odour; and the taste is bitterish, subacrid, and biting. It is very hard, heavier than water; its sp. gr. 1·333; it is externally yellowish, and internally of a blackish brown colour mixed with green streaks. Its goodness may be ascertained by exposing its raspings to the fumes of nitric acid, which give it a bluish-green colour, if it be good: yet the decoction is not affected by nitric acid. The *guaiacum* has a fragrant odour, with scarcely any taste, but it occasions, when swallowed, a sensation of heat in the throat. It has a resinous aspect; is of a greenish-brown colour externally, and internally presents a mixture of greenish, reddish, and brownish tints. It is somewhat translucent, is brittle, breaks with a splintery, vitreous fracture, and is easily reduced to a powder, which is grey at first, but becomes green in a short time when it is exposed to the air and light; a change which appears to depend on the absorption of oxygen.[1] The specific gravity of guaiacum is 1·2289. It was generally regarded as a gum resin, till Mr. Brande's experiments showed it to be a substance *sui generis*, differing from both gum and resin.

When guaiacum is digested in *water* a little extractive only is dissolved, in the proportion of 9 parts in 100, and the infusion has a greenish brown colour and a sweetish taste. *Alcohol* dissolves readily 95 parts in 100, and the solution, which is dark reddish-brown, is decomposed by the mineral acids, affording precipitates which assume various tints of colour. (See *Tinctura Guaiaci.*) *Sulphuric ether* dissolves four parts in ten of guaiacum, and when the solution is evaporated on water, it leaves a tough, pellucid, pale-brown pellicle, which appears to be pure guaiacum. It becomes green after some time: and a small portion of extractive remains dissolved in the water. The fixed *alkalies* in *solution* and solutions of their carbonates dissolve it readily; and these solutions are precipitated by the diluted sulphuric, the nitric, and the hydrochloric acids. *Sulphuric acid* dissolves it with scarcely any effervescence; affording a solution of a rich claret-colour, which, when

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[1] This effect of light and air was first noticed by Dr. Wollaston, who found that the most refrangible rays produced this change; and subsequent experiments of Mr. Brande clearly proved it to arise from oxygen. I found that the change takes place in an hour, when the powder is exposed to sunshine. It appears to be again deoxidised if exposed to the least refrangible rays only, according to Dr. Wollaston's experiments.

fresh prepared, deposits a lilac-coloured precipitate on the addition of water; and when heated, separates some charcoal. *Nitric acid* dissolves it with strong effervescence and a copious extrication of nitrous fumes; and when the solution is evaporated, it yields a large portion of oxalic acid. The diluted acid converts it into a brown resinous, or extractive substance. *Hydrochloric acid* dissolves a small portion only, and affords a solution of a brown colour. I found that, during the solution of guaiacum in these acids, the heat which was evolved raised the thermometer in the following proportions: in the sulphuric, 44°; in the nitric, 120°; and in the hydrochloric, 8°. When the powder of guaiacum is rubbed, with water and any substance containing gluten, it tinges the substance blue; and the same colour is developed in mucilage of Acacia gum made with cold water. Milk, also, acquires a blue colour with the tincture, if it has not been long kept. Nothing is obtained from the distillation of guaiacum in water; but Mr. Brande obtained from 100 parts of it distilled *per se* in close vessels the following products: *acidulous water* 5·5, *thick brown oil* 24·5, *thin empyreumatic oil* 30·0, *charcoal* remaining in the retort 30·5, and 9·5 of *gases*, which were chiefly *carbonic acid* and *carburetted* hydrogen.[1] The resin of guaiacum has acid properties, and has been named *Guaiacic acid;* and its combinations with bases, *Guaiacates.* According to the analysis of Dr. Ure[2], pure guaiacum (*Guaiacic acid*) consists of 67·88 per cent. of carbon + 7·05 hydrogen + 25·07 oxygen = 100·00; or, according to Johnston[3], of $C_{40}\ H_{23}\ O_{13}$.

It is sometimes adulterated with common resin and manchinal gum. The former is detected by the odour of turpentine emitted when the suspected guaiac is thrown on hot coals; and the latter, by adding to the alcoholic solution a few drops of sweet spirit of nitre, and diluting with water, the guaiac is precipitated, but the adulteration floats in white striæ.

Medical properties and uses. — Both the wood and the guaiac are stimulant, diaphoretic, diuretic, and purgative. The wood was introduced into Europe by the Spaniards, as a remedy for lues venerea, in 1508, by Gonsalvo Farrand, and gained much celebrity from curing Ulrich Van Hutten; but it had long before been used for the same purpose by the natives of St. Domingo: and it is not certain that Van Hutten's case was one of pure syphilis, as he had been suffering from the disease from the age of nine years. It obtained so much reputation, however, that the exhibition of mercury was discontinued for a considerable length of time[4]; and even in

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[1] *Philosophical Trans.* 1806, and *Phil. Mag.* xxv. 107.

[2] *Dictionary of Chemistry.*

[3] *Proceedings of Roy. Soc.* 1841.

[4] It was then sold for seven gold crowns a pound.

the eighteenth century its specific powers over this disease were maintained by Boerhaave: but frequent disappointments and more correct observations have shown that it possesses no powers of eradicating the venereal virus; and that it is useful only after a successful mercurial course, for repairing the strength and vigour of the system; "and where a thickened state of the ligaments, or of the periosteum, remains, or where there are foul indolent ulcers[1];" or in suspending the progress of some of the secondary symptoms for a short time, as ulcers of the tonsils, eruptions and nodes. The decoction of the wood has been found more useful in cutaneous diseases, scrofulous affections of the membranes and ligaments, and in ozœna. The guaiacum resin itself is an efficacious remedy in chronic rheumatism and arthritic affections[2], as well as those diseases for which the decoction of the wood is usually given; and it may be regarded as the active ingredient of the guaiacum wood. Its sensible effects are a grateful sense of warmth in the stomach, dryness of the mouth, and thirst, with a copious flow of sweat, if the body be kept externally warm, or if the guaiacum be united with opium and antimonials: but when the body is freely exposed to cool air, instead of producing diaphoresis, it augments considerably the secretion of urine. It sometimes causes nausea, vomiting, and irregularities of the bowels, in which case its use should be discontinued.

Guaiacum may be exhibited either in substance or in tincture. The dose is from grs. x. to ʒ ss., in the form of pills or of boluses; or made into an emulsion with water by means of mucilage or yolk of egg. Larger doses purge.

Officinal preparations. Of the wood: — *Decoctum Guaiaci*, E. Of the Guaiacum: — *Mistura Guaiaci*, L. E. *Tinctura Guaiaci*, E. D. *Tinctura Guaiaci composita*, L. *Tinctura Guaiaci ammoniata*, E. Guaiacum wood and resin are contained in some other officinal preparations; as *Decoctum Sarzæ compositum*, &c.

GUMMI ACACIA. See *Acacia.*

HÆMATOXYLON.[3] *Spec. Plant. Willd.* ii. 547.

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[1] *Pearson's Observations on the Effects of various Articles of the Materia Medica in the Cure of Lues Venerea*, p. 10.

[2] *The Chelsea Pensioner*, a nostrum by which Lord Amherst was cured of rheumatism, is composed of *Guaiac* ℥j., *Pulv. Rhei* ʒij. *Supertart. Potassæ* ℥j., *Sulph.* ℥ij., *Nucis myrist.* j. *in pulv. trit. et per opem mellis misce ut fiat Electuarium.* Two large spoonsful to be taken night and morning. *Jesuit Drops* also consist of *Guaiacum*, *Balsam of Copaiba*, and *Oil of Sassafras*, made into a tincture by spirit. — *Pharmacologia*, p. 237.

[3] From *αἷμα*, blood, and *ξυλον*, wood. — *Miller's Dictionary.* The trivial name *Campechianum*, and the English term *Campechi* wood, originated from *Palo de Campeché*, the name imposed by the Spaniards who first discovered the wood. An act had been passed to prohibit its importation into England, but it was repealed in 1661. About 14,092 tons are annually imported.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Leguminosæ.

G. 830. *Calyx* five-parted. *Petals* five. *Capsule* lanceolate, one-celled, two-valved, with the valves boat-shaped.

Species 1. H. *Campechianum.* The Logwood tree. *Med. Bot. 3d edit.* 455. *t.* 163. *Hayne*, x. 44.

Officinal. HÆMATOXYLUM, *Lond.* HÆMATOXYLON, *Edin.* HÆMATOXYLON CAMPEACHIANUM, *Dub.* The Logwood tree: the wood.

Syn. Bois de Campèche (*F.*), Kampeschen-holz, Blauholz (*G.*), Campechehout (*Dutch*), Campeschetrace (*Dan.*), Campechetrad (*Swed.*), Campeggio (*I.*), Palo de Campeché (*S.*), Pao de Campeche (*Port.*), Lazonevoe derevo (*Russ.*).

This tree is a native of South America, and attains to great perfection at Campeachy, in the bay of Honduras. It was introduced into Jamaica in 1715, and from its quick growth now abounds in a degree which much incommodes the landholders in the neighbourhood of Savannah-la-Mar. It flowers in March and April.[1] The stem and branches are generally crooked; the former is seldom above twenty inches thick; and the tree scarcely ever rises more than twenty-four feet in height. It is covered with a dark-coloured rough bark; and has many smaller ramifications, which are close, prickly, and beset with strong spines. The *leaves* are abruptly pinnate, each composed of four or five pairs of sessile, obcordate, obliquely nerved leaflets. The *flowers* are in terminal, spicular clusters; the calyx consists of brownish purple-coloured, oblong, obtuse segments; the *petals* are five, spreading, obtusely lanceolate, and of a reddish-yellow colour. The *stamens* are ten, downy, tapering, shorter than the corolla, with small, oval anthers; the *fruit* is a double-valved pod, containing five or six small, flat, reniform seeds.

Logwood is brought to this country in logs, which are afterwards chipped. Those pieces which have a deeper colour are preferred. It is much employed as a dye-wood.

Qualities.—This wood is inodorous, but has a sweet astringent taste: it is hard, compact, heavy, and of a deep-red colour, which it gives out both to water and alcohol. The recent infusions made with cold distilled water are yellow, but those with common water have a reddish-purple colour, which is deepened by the alkalies, and changed to yellow by the acids. They form precipitates with sulphuric, nitric, hydrochloric, and acetic acids, solutions of alum, sulphates of iron and of copper, acetate of lead, and potassio-tartrate of antimony[2]; which are, therefore, incompatible in prescriptions with these infusions and decoctions. According to Chevreul, logwood contains a *volatile oil, tannin, two kinds of colouring*

[1] It was cultivated in this country by Mr. Miller in 1739; but is now seldom found in our hothouses.

[2] When an infusion or decoction of logwood is kept for some time, it becomes capable of producing a precipitate with gelatine; but when recent, no such effect takes place either with glue or isinglass. This was first observed by Dr. Bancroft.

matter,—one of which is soluble both in water and alcohol, the other soluble in alcohol only,—*acetate of lime* and of *potassa*[1], and a peculiar substance, of a slightly astringent, bitter, and acrid taste, named *hematin* or *hæmatoxylin*. This is procured by digesting rasped logwood in water of the temperature 125°, filtering, and evaporating to dryness; then digesting the residue for a whole day in alcohol of sp. gr. 0·837, filtering, and concentrating by evaporation; a small portion of water is then to be added, and the evaporation being carried a little farther, it is to be left to crystallize. Hæmatoxylin occurs in brilliant crystals of a yellowish-red colour, which is deepened by exposure, especially in an ammoniacal atmosphere: soluble in hot water, alcohol and ether; its solutions are brightened by acids, and rendered dark purple by alkalies. Its formula is stated to be $C_{20}\ H_{17}\ O_{15}$.

Medical properties and uses.—Logwood is supposed to be astringent: but this is at least a questionable opinion; for although it produces an ink with sulphate of iron, it possesses no acerbity, and does not produce a precipitate with gelatine.[2] It is employed in diarrhœa, and in the latter stage of dysentery; but the extract is more usually ordered. It has the advantage of giving tone to the general system, and thus obviates the lax state of the intestines. When taken into the stomach, it imparts a red colour to the urine in twenty-five minutes after it is taken. The decoction may be administered in doses of two or three fluid ounces, frequently repeated.

Officinal preparations.—*Extractum Hæmatoxyli*, L. E. *Decoctum Hæmatoxyli*, L. E. D.

HEBRADENDRON. See *Stalagmites*.

HELLEBORUS. *Spec. Plant. Willd.* ii. 1335.

Cl. 13. *Ord.* 6. Polyandria Polygynia. *Nat. ord.* Ranunculaceæ.

G. 1089. *Calyx* none. *Petals* five or more. *Nectaries* bilabiate, tubular. *Capsules* many-seeded, nearly erect.

Species 1. H. *niger*. Black Hellebore. *Woodville's Med. Bot. t.* 18. *Jacq. Flor. Austr. t.* 201. *Hayne*, i. 7, 8.

Species 3. H. *officinalis* (*orientalis*). Officinal Hellebore. *Sibthorp, Flora Græca. Linn. Trans.* vol. viii. 305. *De Candolle, Syst. Nat.* vol. i. 316. *Hayne*, i. 2.

Officinal. HELLEBORUS, *Lond. Edin.* The rhizome and roots of black Hellebore.

Syn. Hellebore; Rose de Noel (*F.*), Schwartze Nieswurzel (*G.*), Swart Prustrot (*Swed.*), Zwart nieskruid (*Dutch*), Sort nyserod (*Dan.*), Tschernaia tschemeritza (*Russ.*), Elleboro negro (*I.*), Helleboro negro (*S. Port.*), Kadugaroganie (*Tam.*), Kherbeksiya (*Pers.*), Kāli Koothie (*H.*), Kherbec usivud (*Arab.*).

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[1] *Annales de Chimie*, lxvii. 254. *Thomson's Chymistry*, v. 206.

[2] Vide *Bancroft*, *Phil. of Permanent Colours*, 2d edit. vol. ii. p. 395.

Black hellebore, the officinal plant really used, and so named from the dark colour of the root, is a native of Austria, the Apennines, and Italy, flowering from December till March; whence it has been called Christmas rose, and has obtained a place in our gardens.[1] The rhizome is perennial, transverse, rough, knotted, externally black, internally whitish, and sends off many depending fibres. The leaves, which are deep green, spring directly from the rhizome, on long maculated petioles; and are composed generally of five leaflets, pedate, two being supported on one partial petiole on each side, and one terminal: the leaflets are ovato-lanceolate, smooth, shining, and coriaceous, with the upper half of each sparsely serrated. The flower-stalks are scapes six or eight inches long, erect, round, somewhat tapering, sheathed, variegated with red, and bearing one or two flowers. The floral leaves are oval, and indented at the apex. The sepals consist of five large, roundish, concave spreading petals, at first white, with a tint of red, deepened by age, but finally changing to green, after the pollen is shed, and the seed impregnated. The petals are greenish yellow, tubular, two-lipped: the upper lip longer and slightly emarginate, the lower finely notched. The filaments are numerous and thread-like, with yellow anthers. The germens, which vary in number from four to eight, become beaked follicles, containing many oval, black, shining seeds.

This plant has been supposed to be the *ἑλλεϐορος μελας* of Hippocrates; but there is every reason for believing that the *officinalis* of Dr. Sibthorp is the drug of the ancients. It was found by Bellonius and Tournefort[2], growing in plenty about Mount Olympus, and the Island of Anticyra, which was formerly celebrated for its production. Sometimes the roots of Helleborus *viridis,* Adonis *vernalis,* Trollius *Europæus,* Actæa *spicata,* Astrantia *major,* and Aconitum *neomontanum,* are, either ignorantly or fraudulently, substituted for black hellebore. These are distinguished chiefly by their colour being paler than the roots of the hellebore. The roots, not the rhizome, are the active parts.

Qualities. — The roots of hellebore are about the thickness of a straw, from four inches to a foot in length, corrugated, of a deep brown black on the outside, proceeding from a rhizome, less than an inch in thickness, but several inches long: they are internally white or yellowish, with a grey earthy tinge. They have an unpleasant but feeble odour; and a sweetish, nauseous, bitterish, acrid taste, benumbing the tongue, and leaving upon it an impression, "as when it hath been a little burnt with eating or supping any thing too hot."[3] The acrimony is impaired by keeping;

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[1] It was cultivated in Britain by Gerarde in 1596.

[2] *Bellonii Obs.* l. iii. c. 41. *Tournefort, Voyage,* ii. let. p. 21. 189.

[3] Grew.

and it appears to depend on a volatile matter, as water distilled from the root has an acrid taste. Both alcohol and water extract its medicinal properties; and, as the spirituous preparation is the most active, these appear to depend on its resinous part. By boiling with water it yields a very considerable portion of gummy matter and some resin. According to MM. Feneulle and Capron, black hellebore contains a *volatile oil*, a *fatty oil*, a *volatile acid*, *resinous matter*, *wax*, an *acrid bitter principle*, and *alumen*, *malate of potassa*, and *ammoniacal salts*. Gallic acid has been stated to exist in this plant, but no alkaloid has yet been discovered.

The herb collectors sometimes substitute the roots of Actæa *spicata* for those of black hellebore. The fraud is known by cutting the root transversely, when the root of Actæa displays the figure of a cross.

Medical properties and uses. — Black hellebore root is a drastic cathartic, and on this property probably depends its emmenagogue powers. In smaller doses it is supposed to act as an alterative. It has been much celebrated in mania, melancholy (by some it has been supposed to exert a sedative influence on the nervous system), also in dropsy, scabies, and worms; but it does not appear to possess any particular advantages over the other resinous purgatives, which act with less virulence. As an emmenagogue it is useful in plethoric habits, when preparations of iron are contra-indicated. When black hellebore is taken in too large a dose, it occasions violent vomitings, inflammation of the stomach, vertigo, tremblings, convulsions, cramps, and death. These effects are to be obviated by evacuating the stomach, by drinking copiously of mild mucilaginous fluids, and then employing powerful antiphlogistic measures. It is seldom prescribed in substance; but either in the form of tincture or of extract, or of decoction made with two drachms of the root to a pint of water.[1] The dose of the root is from grs. x. to ℈ j., which purges strongly; but to produce its other effects two or three grains are sufficient. Of the decoction f ℥ j. may be given every four hours. At the present time this plant is but little employed in medicine, and has been omitted from the Dublin Pharmacopœia.

Officinal preparation. — *Tinctura Hellebori*, L.

HELONIAS.

Cl. 23. *Ord.* 1. Polygamia Monœcia. *Nat. ord.* Melanthaceæ.

Species. H. *Sabadilla.* Sabadilla plant. *Don, Ed. Ph. Journ.* 1832. *Hayne,* xiii. 27. Veratrum *Sabadilla, Retz. Obs. Bot.* i. 31. *Descourtilz, Ann. Soc. Linn. Paris,* 1824. *Lindley, Flora Med.* 586.

Officinal. SABADILLA, *Edin.* Assagræa officinalis, *Lindley.* Fruit of

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[1] Wintringham, *Thesaurus Med.* p. 87.

Veratrum Sabadilla, of Helonias officinalis, and probably of other Melanthaceæ. Cevadilla.

Syn. Cevadille, poudre de capuchin (*F.*), Sabadil samon (*G.*), Sabadille koren (*Dan.*), Tschemeritschnik vehemornoi (*Russ.*).

The plant, which yields the sabadilla of commerce, was discovered by Schiede to be a distinct species from Veratrum *Sabadilla*, to which it was formerly referred. He named it V. *officinale*. It is the same plant described by the late Professor Don under the name of Helonias *Sabadilla*; and that regarded as a species of a new genus, by Dr. Lindley[1], and named by him Asagræa *officinalis*. It is a native of Mexico, and is found on the east side of the Andes, near Barrama de Tioselo, by the Haciendo de la Luguna, in grassy places. The stem is annual, rising from a bulb, to the height of three to six feet, and terminated with a spike of densely yellow flowers, intermingled with males by abortion. The floral envelope is six-partite, the segments linear, veinless, equal: the stamens are six, inserted into the base of the calyx, and supporting cordate anthers: the ovaries are three. The follicles are also three, oblong, acuminate, feathery: the seeds are scimitar-shaped, corrugated, winged.

Qualities.—The seeds of sabadilla are inodorous, of a bitter acrid taste. They yield their properties to rectified spirit. They have been analysed by Pelletier and Caventou[2], and found to contain a *supergallate of Veratria;* a peculiar *odorous acid,* which they have named *Cevadic; eläine* and *stearine; wax;* a *yellow colouring matter; starch, gum,* and *lignin.* But according to a subsequent analysis by M. Couerbe, sabadilla contains another alkaloid, which he has denominated *Sabadilline,* crystallizing in white, six-sided, acicular prisms, acrid, fusible, soluble in hot water, very soluble in alcohol, but insoluble in ether, and capable of forming salts with acids. Its formula is $C_{20}\ H_{13}\ N\ O_5$. Couerbe also mentions a substance resembling a gum resin, which he names *Monohydrate of Sabadalline:* red; very soluble in water and alcohol; scarcely soluble in ether; saturating but not capable of forming crystallizable salts with the acids; and precipitated from its solutions by the alkalies, without combining with them.

Merck has discovered in these seeds an acid which he has named *Veratric;* soluble in alcohol, less so in water, insoluble in ether, fusible and volatile. Formula $C_{18}\ H_9\ O_7 + H\ O$.

Other bodies have been occasionally found in sabadilla, but little is known regarding them. For properties of Veratria, *see* Part III.

Medical properties and uses.—Sabadilla operates as a drastic cathartic with so much violence that it is scarcely ever internally administered: nevertheless Schmuker has given it in cases of tænia,

[1] *Bot. Mag. June,* 1839.

[2] *Journ. de Pharm.* vi. 353.

and carried the dose of the powder to half a drachm. It is externally applied to destroy pediculi; yet, even in this mode of using it, if the scalp be denuded or ulcerated, vertigo, convulsions, and sometimes death, have followed its employment. Its introduction into the Edinburgh Pharmacopœia is for obtaining Veratria.

HEMIDESMUS.

Lin. Class and Order. Pentandria Digynia. *Nat. ord.* Asclepiadaceæ.

G. *Corolla* rotate, with five pointless scales inserted below the sinuses. *Filaments* connate at the base, distinct at the upper end, inserted into the tube of the corolla. *Anthers* cohering, separate from the stigma, beardless, simple at the point. *Pollen masses* twenty, granular, attached in fours to a solitary uniform appendage of each corpuscule. *Stigma* flattish, pointless. *Follicles* cylindrical, very much divaricating, smooth. *Seeds* comose. — Wight and Arnott.

Officinal. HEMIDESMUS INDICUS, *Dub.* Indian Sarsaparilla. The Root.

Root long and slender, with few ramifications, covered with rust-coloured bark, which possesses a peculiarly pleasant sort of fragrance, whether fresh or dried. Stems twining, diffuse, or climbing, woody, slender, generally from the thickness of a goose's quill to that of a crow's quill, nearly smooth. Leaves opposite, short-stalked, in shape variable. On the young shoots that issue from old roots, and lie on the earth, they are linear, acute, and striated down the middle with white; on the superior, and old branches, they are generally broad, lanceolate, even sometimes ovate or oval; all are entire, smooth, shining, and of a firm texture, the length and breadth very various; stipule four-fold, small, on each side of each petiole, caducous. Racemes axillary, sessile, imbricated with flowers, and then with scales like bracts. Flowers small; outside green, inside a deep purple. Calyx divisions acute. Corolla flat; divisions oblong, pointed, inside rugose. Follicles long, slender, spreading.[1]

Qualities. — As met with in commerce it occurs in pieces of about ten to twelve inches in length, in thickness varying from $\frac{1}{8}$ to $\frac{1}{3}$ inch; brownish externally, tortuous, slender, cylindrical, rugous, longitudinally furrowed, transversely and deeply fissured, the outer or cortical portion corky, which surrounds a woody meditullium. The odour is rather powerful and agreeable, somewhat like that of sassafras: some compare it to that of the Tonquin bean; its taste is slightly bitter, sweetish, mucilaginous. Little is known of the composition of this root. Mr. Gordon has found in it a volatile acid, named smilasperic acid, from an idea prevalent at the time that the root was obtained from Smilax

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[1] *Lindley, Flora Medica.*

aspera: this, however, has been proved to be erroneous, and Dr. Pereira proposes to call it Hemidesmic acid.

Medical properties and uses. — The root of Hemidesmus Indicus, when taken internally, does not produce any very evident physiological symptoms: it has, however, gained much repute in India, in the treatment of nephritic complaints; and it is said by Dr. Ashburner to act as a diuretic, also as a general tonic, and has been used as a substitute for sarsaparilla in syphilitic and other affections: it is stated to increase the appetite and improve the general health. In this country it has not obtained much repute, but the Dublin College have now introduced it into their Materia Medica, and also ordered an officinal preparation. It is generally used in the form of infusion or decoction, made with two ounces of the root to a pint of water; and the whole of this quantity may be given in the course of the day.[1]

Officinal preparation. — *Syrupus Hemidesmi*, D.

HIRUDO.[2] *Syst. Nat. Gmelin.* i. 3095.

Div. 3. *Cl.* 1. Annelidæ, *Cuv.*

G. 280. Body oblong, truncated at both extremities, cartilaginous, moving by dilating the head and tail.

Species 2. H. *vel Sanguisuga medicinalis.* The medicinal Leech. *Amœnit. Academ.* vii. 40. *Treatise on the Med. Leech, by J. R. Johnson, Lond.* 1816. *Hist. Nat. des Sangsues, par J. L. Derheims, Paris,* 1825. H. *vel Sanguisuga officinalis, Savigny.*

Officinal. HIRUDO, *Lond. Dub.* SANGUISUGA MEDICINALIS ET OFFICINALIS, *Lond.* HIRUDO MEDICINALIS, *Dub.* The Leech.

Syn. Sangsue (*F.*), Blutegel, Ægle, Lyche-lake (*G.*), Bloedsuger (*Dutch*), Blodigle (*Dan.*), Pijavoka (*Pol.*), Sanguisuca, Mignatta (*I.*), Sanguijuela (*S.*), Piavitza (*Russ.*), Khéruheen (*Arab.*), Jonc (*H.*), Jelauca (*Sans.*), Utter (*Tam.*), Patchet (*Malay*), Zeloo (*Pers.*), Lek, Leikeis (*Mæso-Gothic*), Læc, Lece (*Saxon*), Lækare, Læknare (*Gothic, Swed.*), Likær (*Sclav.*).

The medicinal leech, Sanguisuga medicinalis, is common throughout Europe, America, and India, inhabiting lakes and stagnant pools. Many of the leeches used in England are brought from France, which again is supplied from Spain, Bohemia, and the frontiers of Turkey. The body is about three inches long, taper-

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[1] Mr. Jacob Bell has given a method of preparing a syrup of this root in the third volume of the Pharmaceutical Journal, the product of which is said to be excellent: —

Take of root of Hemidesmus Indicus, 1 lb. avoirdupois; refined sugar 1 lb; distilled water, about 3 pints. Bruise the root, separate the bark by sifting, and reject the wood. Add to the bark an equal bulk of washed sand, moisten them with water, and pack in a displacement apparatus. Macerate for four hours, and displace the liquor by the requisite quantity of water; reserving the first six ounces. Add more water until it passes through tasteless, and evaporate it to three ounces, in which, by the addition of the first six ounces, dissolve the sugar with as moderate a heat as possible.

[2] Βδελλα Græcorum. Named by the Romans *haurio*, expressive of its well-known peculiar action. — *Johnson's Treatise*, p. 40.

ing towards the head, composed of semi-cartilaginous, dilatable rings, usually about one hundred, increasing in size, but not in number, with age. They are capable of only a certain degree of extension; but the body of the animal can be much lengthened, and contracted. The colour of the back is dark olive, divided by four yellow, or buff-coloured, longitudinal lines, two of which are lateral, with a black line running through their centres: and the other two, which are on the upper part of the back, dividing it into three nearly equal parts, are broken with black spots. Within these lateral and upper lines are two others, which appear like chains of black and yellow. The belly is pale-olive, thickly maculated, with black, or very dark-blue, irregular spots. The skin is mucose, spongy, and covered with a black pigment, formed of molecules of various sizes. The surface is extremely susceptible of touch. The head, when the animal is at rest, is a disk of a horse-shoe shape, composed of three capillary straight muscles, radiating from the gorge to the circumferenee of the disk. There are ten points arranged in a crescent at the back of the head, deep black, and when moistened having a fine lustre, which are supposed to be eyes. The mouth consists of three jaws, placed in the centre of a horse-shoe sucker which is under the head; within it are three small white jaws which are beset with teeth from 79 to 90 in number: these jaws are somewhat pyramidal, plaited, and lanceolate. When the portion of skin is sucked into the mouth, the teeth acting like a saw, cut out and form a triangular puncture.[1] Straus-Durkheim says that the teeth are small, horny, numerous, and form a kind of saw.[2] At the anal extremity there is a broad circular sucker, fibrous, with the fibres, which are fleshy, divaricating from a central point[3]; it is a prehensile organ, by which the animal attaches itself to different bodies. The Sanguisuga officinalis has a paler, greenish black back, with six unspotted stripes, often interrupted; the belly is olive-green. They are imported chiefly from Hamburgh.

Leeches are oviparous. They are androgynous, and the generative process is performed by reciprocal and spontaneous impregnation. The male organ is situated at the twentieth ring, the female at the twenty-fifth. They couple in the end of May, in June, and towards the middle of August. The ova are cocoons, each of which contains nine leeches. The cocoons are usually

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[1] *Derheims, Hist. Nat. des Sangsues.*

[2] *Consid. générales sur l'anatomie comp. des animaux articules*, p. 220.

[3] The organs of touch are supposed to reside in the upper lip and the disc of the caudal extremity; those of taste, in some nervous fibrillæ in the upper part of the œsophagus; those of hearing, unknown; but the probability is that the leech is destitute of hearing: they have no organs of sight: those of smell, probably, are in the punctata respiratoria. The leech, however, breathes by oscula with gills, under which are small bags situated beneath the intestinal canal.

seen in the beginning of July; or from twenty to thirty days pass between the act of copulation and the appearance of the cocoons. They are received into a kind of mucous web secreted by the leech, from which it frees itself after the cocoons are placed in it. The length of the cocoon is from seven to eight lines, the breadth from three to eight. The young leeches are at first red. There is only one breed in the year. The young escape from the cocoon in thirty to forty days.[1] All the cocoons are discharged in one involucre, near the surface and the margins of pools, and are hatched by the heat of the sun. They do not cast the skin, as has been generally supposed, but at certain times throw off a tough slimy substance from their bodies, apparently the production of disease; and from which they get disencumbered by drawing themselves through between the moss and the matted roots of rushes.[2] During winter they remain almost torpid, hid amongst the thick net-work of aquatic roots which surround the pools. They are very tenacious of life; for they live for many days in the exhausted receiver of an air-pump, and in gases and other media which in general are destructive of animal life. This is to be explained by the slow oxygenation of the blood which takes place in the breathing vesicles.

Norfolk supplies a great part of the leeches which are brought to the London market; some are taken also in Suffolk, Hampshire, Kent, Essex, and Wales, but many are imported from Bordeaux, Hamburgh, and Lisbon.[3] La Brenne in France furnishes a large number. They are caught in spring and autumn by people who wade into the pools and allow them to fasten on their limbs; or, more generally, the catchers beat, as they wade in, the surface of the water with poles, which sets the leeches in motion, and brings them to the surface; when they are taken with the hand and put into bags. As they come to the surface just before a thunderstorm, this is regarded as a good time for collecting them. They are put into bags and pressed very closely together. They are best preserved in wooden vessels half filled with soft water, kept in an equal and moderate temperature (50° Fahr.), and covered over with a coarse cloth so as to admit the air. When the number is great, the water should be drawn off by a cock, placed about $2\frac{1}{2}$ inches above the bottom of the vessel, which should be covered with a layer of moss-turf and wood charcoal, with some small stones heavy enough to keep the turf in its place: and several small roots of the Acorus *calamus* should be placed in the vessel to vegetate,

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[1] *Journal de Phys. experien.* tome vii. 1827.

[2] I give this on the authority of Mr. Dickson, of Covent Garden, who has made many curious observations on the economy of the leech.

[3] These differ from the English leeches chiefly in having the belly of one uniform colour.

as this plant is supposed to yield nutriment to the leeches.[1] The water should be changed once a week; and all the dead or sickly leeches,—such, for instance, as feel flabby, or exhibit protuberances or white ulcerated spots on the body,—should be removed from the general stock, for they are subject to many diseases and great mortality. When the water is not changed, the leech suffers from inflammation of the intestinal canal, in which case it will not suck. Leeches which have been used should not be returned to the stock till they appear to have completely regained their health and vigour, which is known by their feeling hard and firm when handled. As we are ignorant of their proper and natural food, it is useless to attempt to feed them[2]; but in winter it would, perhaps, be advantageous to put some moss into the vessel in which they are preserved. Owing to the scarcity of the medicinal leech, a species, named *troctina* by Dr. Johnson, has been much used. It differs from the medicinal leech in being marked with golden-coloured rings surrounding a black spot, on a brown ground: the sides are yellowish, and the belly greenish yellow, spotted with black.

Medical uses.—Leeches appear to have been first used by Themison.[3] They are applied in cases where there is local congestion, and in febrile affections, accompanied with local inflammation, and in which local blood-letting is consequently necessary, as in ophthalmia; and particularly to places where cupping-glasses cannot be applied. In some habits, where there is a disposition to erysipelatous inflammation, their bites, which are triangular, occasion a considerable degree of irritation, and œdematous swellings follow, which are exceedingly troublesome; but in general they easily heal, and cause no inconvenience.

It is sometimes exceedingly difficult to make leeches bite, which they never will do when they are sick. The best mode of applying them is to take them out of the water for some minutes before they are to be used, and to dry them well with a very soft cloth directly before they are applied. The part should also be well cleaned with soap and water, then washed with a little pure water, and made very dry. If there be any hairs on the spot, these must be close shaved. The leeches should then be put into a hollow in a soft towel, folded up as a napkin, and the whole applied at once. As soon as they adhere the towel should be removed. I have found this method preferable to that of wetting the part with milk

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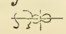
[1] *Horn's Archiv. für medizinische*, &c. Jan. 1826.

[2] Dr. Johnson says, they live by adhering to and sucking the fluids of fish, frogs, &c.; but they take no kind of solid food.—*Treatise on the Medicinal Leech*, p. 61.

[3] The annual consumption of leeches in Paris alone is three millions.—*Richard's Hist. Nat. Med.* tom. i. p. 357.

and sugar, blood, or any other matter.[1] When they, nevertheless, will not readily fix, or when it is wished to apply them very exactly on a particular spot, as, for instance, close to the angle of the eye in ophthalmia, Dr. Johnson recommends to puncture the part with a lancet; but I find that putting them into a large quill cut at both ends, and applying the end at which the head of the animal lies to the part, with the finger over the other end, is an excellent mode of making them bite. The quill is withdrawn after they are firmly fixed. Very few leeches can draw more than half a fluid ounce of blood; and, therefore, it is necessary, in order to increase the quantity, to keep the orifices bleeding by bathing them with hot water, or by the application of a hot dry towel or a poultice. It has been recommended to cut off the tail of the leech, so as to allow the blood to be discharged as fast as it is sucked, the leech continuing to suck notwithstanding this mutilation. They drop off spontaneously whenever they are gorged with blood; and they may be separated at any time by sprinkling a little salt, or, what is better, a little powder of ipecacuanha, on the head. The cause of the leech dropping off when it is full has never been philosophically examined. It appears to me to depend on the compression of the breathing vesicles[2] of the animal, by the distension of the stomach and intestinal canal, opposed by the skin having only a limited extensibility, so that the animal being no longer able to breathe falls into a state of asphyxia; consequently it loses all muscular energy; and thus, being unable to retain itself longer on the part, it drops off. After leeches drop off, the application of a very little salt, or ipecacuanha powder, as recommended by Dr. Robert Dick, of Glasgow, makes them disgorge all the blood they have sucked: and if they be immediately thrown into clean water, and this repeatedly changed for three or four times, they soon recover their health and vigour. Dr. Johnson advises the use of vinegar instead of salt, which is not apt to blister the lips of the leech as salt does, preventing it from sucking for some considerable time; but, perhaps, it is still better merely to strip them through the fingers, and then throw them into clean water. Sometimes it is extremely difficult to stop the hæmorrhage from leech-bites in children: every kind of styptic has been used without effect, and the result has sometimes been fatal. In obstinate cases, a small piece of nitrate of silver, cut like a pencil, and the point introduced into the wound, will stop the bleeding; or a small sewing needle may be passed across the wound, and a thread twisted round it thus  as in the operation for hare-lip.

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[1] Dr. Johnson recommends that they be put into a cup of porter, "which will induce them to bite with great avidity." — *l. c.*

[2] These vesicles are arranged along each side of the animal, appearing by an external pore which is guarded with rays that act as gills when the animal is in the water.

HORDEUM. *Spec. Plant. Willd.* i. 472.

Cl. 3. *Ord.* 2. Triandria Digynia. *Nat. ord.* Graminaceæ.
G. 151. *Calyx* lateral, two-valved, one-flowered, three-fold.
Species 3. H. *distichon.* Common Barley. *Viborg-Cereal,* 35. *t.* 3.
Officinal. HORDEUM, *Lond. Edin. Dub.* Barley. The decorticated seeds of Hordeum Distichon. Pearl Barley.

Syn. Orge mondé (*F.*), Gerstengraupen (*G.*), Gemeenegarst (*Dutch*), Byg (*Dan.*), Korn (*Swed.*), Jeezmien (*Pol.*), Orzo (*I.*), Cebada (*S.*), Cevada (*Port.*), Yatschemen (*Russ.*), Iow (*H.*), Bārlee Arise (*Tam.*), Dhourra (*Arab.*).

Barley is asserted by Reidesel to be a native of Tartary, but the fact is not well ascertained.[1] It is an annual plant, and cultivated in almost every country of Europe. This species, H. *distichon,* which is the most generally cultivated in Britain, has a long flat spike or ear, with a double row of male florets on each flat side, and a single row of fertile florets at each edge. The valves of the calyx, or outer chaff, are linear, and one half shorter than the corolla or inner chaff, which terminates in a straight, serrated awn or beard, sixteen times its own length. When ripe, the husk is coriaceous, angular, and continues close about the grain, which, when freed from it, is ovate, grooved, and angular.

Barley is used as an article of food, but less so than it was in former times; and it is now chiefly cultivated for the purpose of forming malt liquors and ardent spirits.[2] It is formed into pearl-barley by two different operations; the barley is first spread out and moistened; and then, in this state, by means of machinery, is denuded of the cuticle, or shelled. It is afterwards rounded in a mill, which at the same time polishes the little granules into which it is formed.

Qualities. — Barley, in its natural state, is oval, oblong, pointed at one end, obtuse at the other, and furrowed longitudinally: it has a mild, sweetish taste. Pearl-barley is inodorous, and has a slightly sweetish taste. It consists of roundish granules of a pearly whiteness, composed almost entirely of starch, with some gluten, mucilage, and saccharine matter[3], which are dissolved in boiling water. The decoction very soon runs into the acetous fermentation. Barley is never used medicinally in substance.

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[1] Carden asserts that it is a native of Athol, in Scotland. Diodorus Siculus refers it to Egypt, where, he says, Osiris found it wild, and first cultivated it.

[2] To form malt, barley must be brought to germinate by soaking it in water; during this process the starch of the grains changes into the state of grape sugar, and at the same time the gluten is decomposed and *diastase* formed.

[3] Einhof, who analysed barley both in the unripe and ripe state, found that 3840 parts of barley, in grain, afforded 430 of a volatile matter, 720 husk, and 2690 of meal; and from the same quantity of barley-meal he obtained 360 of *volatile matter,* 44 *albumen,* 200 *saccharine matter,* 176 *mucilage,* 9 *phosphate of lime,* with some *albumen,* 135 *gluten,* 260 *husk,* with some *gluten* and *starch,* and 2580 of *starch:* 76 parts were lost in the analysis. When this meal is macerated in alcohol it yields a yellow-coloured, acrid, thick oil, which is supposed to give the peculiar flavour to spirits from raw grain, and to be lost in malting. — *Thomson's Chymistry,* v. 254.

Officinal preparations.—*Decoctum Hordei*, L. D. *Decoctum Hordei compositum*, L. *Mistura Hordei*, E.

HUMULUS. *Spec. Plant. Willd.* iv. 769.

Cl. 22. *Ord.* 5. Diœcia Pentandria. *Nat. ord.* Urticaceæ.
G. 1795. *Male.* *Calyx* five-leaved. *Corolla* none.
——— *Female.* *Calyx* one-leaved, obliquely spreading, entire. *Corolla* none. *Styles* two. *Seed* one, within a leafy calyx.
Species 1. H. *Lupulus.* The Hop. *Eng. Bot. t.* 427. *Smith's Flor. Brit.* 1077. *Bigelow's Amer. Med. Bot.* iii. 163. *Hayne*, iii. 164.
Officinal. LUPULUS, *Lond. Edin. Dub.* HUMULUS LUPULUS. The Hop; the dried Strobiles of the Hop. The Catkin.

Syn. Houblon grimpant (*F.*), Hopfe (*G.*), Hoppe (*Dutch*), Humle (*Swed. Dan.*), Chmel (*Russ.*), Lupulo (*I.*) Hambrecillo (*S.*), Hambrezilho, Lupulo (*Port.*).

The hop is an indigenous perennial plant, growing in hedges, and flowering in July. It is very abundantly cultivated in Kent, Essex, Surrey, and Suffolk: and the strobiles are picked about the end of August or the beginning of September.[1] The root sends up many long, striated, angled, rough, flexible stems, which support themselves by twining round upright bodies in a spiral direction from left to right. The leaves are opposite, in pairs, petiolate, heart-shaped, serrated, entire, or lobed, and of a dark green colour on the upper disk. Both the leaves and petioles are scabrous, with minute prickles; and at the base of each leaf-stalk are two interfoliaceous, entire, reflected, smooth stipules. The flowers are axillary, and furnished with bracts: the male is yellowish white, in panicles, and drooping; the female, which is on a distinct plant, is in solitary cones or strobiles, ovate, and pendulous; composed of membranous scales of a pale greenish colour, tubular from being rolled in at the base, and two-flowered, each containing one round, flattish seed of a bay-brown colour, surrounded with a sharp rim, and compressed at the tip.

At the proper season, while the strobiles are yet scarcely ripe, the plants are cut about three feet from the ground, the poles on which they are twined pulled up, and the strobiles carefully picked

[1] The culture of the hop-plant was introduced into England from Flanders in 1524, and the strobiles were first used for preserving English beer in the latter part of the reign of Henry VIII.; but the prejudice against them was very considerable, and the city of London, a hundred years afterwards (in 1650), petitioned the parliament to prevent their use. Nevertheless, in 1557, from the following lines in *Tusser's Treatise on Husbandry*, they appear to have been again used:—

> "The hop, for his profit, I thus do exalt:
> It strengtheneth drink, and it flavoureth malt:
> And being well brewed, long kept it will last,
> And drawing abide, if ye draw not too fast."

There are now, however, severe penalties inflicted on brewers who use any other bitter for preserving their beer. In 1830, the number of acres cultivated with hops in Great Britain were 46,727; the average quantity of hops grown is about 20,000,000 of pounds.

off one by one. Those that are over-ripe or defective are separated from those that are ripe enough, and both kinds are carried to the kiln as soon as possible after they are picked. The heat of the kiln requires to be regulated with great nicety; and in order to prevent them from drying too fast, many kilns have two floors, on the uppermost of which the greener hops are laid, and gradually dried before being brought to support the heat of the lower floor.[1] Charcoal is the fuel usually employed; other kinds of fuel injuring the flavour of the hops: and in some instances the drying is effected by pipes of hot water passing close under the drying floor. The best temperature is between 100° and 112°. In bagging them, the closer the hops are trod the better they keep. The strobiles are considered sufficiently dried when they become crisp; but they acquire a degree of toughness and tenacity before they are bagged, from being laid in heaps in the storehouses. Five pounds of moist or under-ripe hops make one pound only when taken from the kiln. The best hops are brought to market in fine canvass sacks called "pockets," each of which contains about $1\frac{1}{4}$ cwt. of hops.[2]

Qualities.—Hops have a strong, peculiar, fragrant, sub-narcotic odour, and a very bitter, aromatic, astringent taste. They have a pale, greenish yellow hue, appear like thin transparent veined leaves; and although not tough, yet are difficult to pulverize. Sir J. E. Smith and M. Planche had noticed a yellow powder which is secreted by the scales of the hop: and some experiments by Dr. A. W. Ives of New York proved that the active properties of the strobiles reside in that substance, which forms one-sixth part only of their weight, and which is easily separated by merely sifting in a fine sieve. Dr. Ives named it *lupulin.* It has the peculiar flavour of hops, and under the microscope seems to resemble the pollen of plants, consisting of globules filled with a yellow fluid. He found in 100 grains of lupulin 4·10 of *tannin,* 8·33 of *extractive,* 9·10 of *bitter principle,* 10 of *wax,* 1 of *resin,* and 38·33 of woody fibre (lignin). MM. Chevalier and Payen[3] obtained from 100 parts 10·3 parts of a *peculiar bitter principle,* 55 of *resin* with traces of *gum,* which is named *opism;* 2·00 of *volatile oil; fixed oil,* some *azotised matter,* and *various salts.* It is probable that this bitter principle is the active agent in the hop. Hops, from which all the lupulin is separated, yield an extract, devoid of the virtues of the hop.[4] The properties of the strobiles are extracted by boiling water, or alcohol, or ether. The watery infusion has a pale straw-colour, is rendered muddy by the mineral acids; alkalies deepen

[1] This is the case at Farnham in Surrey. See *Stevenson's Survey,* 363.

[2] The qualities regarded by dealers are colour, scent, seed, and glutinous touch. The colour should be light green, the scent should be agreeable and aromatic; the seed such as to afford weight to the hop; and the touch viscid.

[3] *Journ. de Pharm.* viii. 209.

[4] *Annals of Phil.* p. 194.

its colour; it strikes an olive with sulphate of iron; is precipitated by alcohol, solution of acetate of lead, nitrate of silver, and potassio-tartrate of antimony; gelatin; oxalate of ammonia detects lime in it; and chloride of barium sulphuric acid, free or combined; and, when rubbed with magnesia or lime, a rod dipped in hydrochloric acid discovers the presence of ammonia. The etherial tincture, when evaporated on water, leaves a pellicle of greenish, intensely bitter resin, and deposits some extractive. By distillation in water, hops yield a volatile, aromatic oil. From these experiments they appear to contain *resin, extractive, volatile oil, tannic acid,* an *ammoniacal salt,* the *bitter principle,* and *lupulin.*

Medical properties and uses. — Hops are narcotic, tonic, diuretic; and, externally applied, anodyne and discutient. Their use as a preservative of beer has been long known. They are also said to possess the power of procuring sleep in the delirium of fever, and in mania, when used as a pillow; and, owing to this effect having taken place in the case of George the Third, their efficacy as a general narcotic, when introduced into the stomach, has been investigated.[1] Dr. Maton observed, that, besides allaying pain and producing sleep, the preparations of hops reduce the frequency of the pulse, and increase its firmness in a very direct manner. One drachm of the tincture and four grains of the extract given once in six hours reduced the pulsations from ninety-six to sixty in twenty-four hours.[2] He found the extract exceedingly efficacious in allaying the pain of articular rheumatism; but our own experience has not afforded us sufficient proof of its utility as a sedative; and Dr. Bigsby's[3] experiments have lessened very much the confidence practitioners were disposed to place in it. An ointment compounded with the powder of the hop and lard is recommended by Mr. Freake as an anodyne application to cancerous sores. We have seen a fomentation of it afford relief in painful swellings and tumours. It may be given in the form of powder, infusion, tincture, or extract. The dose of the powder is from grs. iij. to ℈ j., given twice or thrice a day.

LUPULINA, *Dub.* Lupulin. The yellow powder separated from the strobiles of Humulus Lupulus.

The chemical properties of Lupulin have been described under LUPULUS. Occasionally *Lupulin* is employed as an internal remedy: it seems to possess all the useful properties of the hop in an exalted degree. The dose may be grs. v. to grs. xv.

Officinal preparations.—*Extractum Lupuli,* L. E. *Infusum Lupuli,*

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[1] *De Roche, De Humuli Lupuli Viribus medicis.*

[2] *Observations on the Humulus Lupulus,* &c., by A. Freake.

[3] Vide *London Medical Repository,* vol. v. p. 97.

L. *Tinctura Lupuli*, L. E. Officinal preparation of *Lupulina*, *Tinctura Lupulinæ*, D.

HYDRARGYRUM.[1] Mercury or Quicksilver.

Syn. Mercure (*F.*), Quicksilber (*G.*), Kwitzilver (*Belg.*), Qwikzilver (*Dutch*), Quicksolv (*Dan.*), Quicksilfwer (*Swed.*), Mercurio Idrangiro (*I.*), Azógue (*S.*), Azougue (*Port.*), Rtut, Sivoe serebro (*Russ.*), Âbue (*Arab.*), Pára (*H.*), Sodum (*San.*), Rassum (*Tam.*), Parah (*Duk.*), Seemab (*Pers.*), Rassa (*Malay*).

This metal is found in Spain, Germany, and Hungary; Siberia, the Philippines, China, and Peru. The most productive mines are those of Idria, Carinthia, and the Palatinate; Almaden near Cordova, in Spain[2]; and Guanca Velica, near Potosi, in Peru.[3] It is procured,

A. In its metallic state:

i. Unalloyed.	Sp. 1. *Native Mercury.*	
ii. Alloyed with silver.	1. *Native amalgam.*	
iii. With sulphur.	1. *Cinnabar.*	Var. *a.* Dark red.
		b. Bright red.
	2. *Hepatic ore*, or *carbo-sulphuret.*	
		Var. *a.* Compact.
		b. Slaty.

B. Oxidized:

iv. Combined with chlorine, and a portion of sulphuric acid.	Sp. 1. *Corneous Mercury.*

Native quicksilver is found either in globules, disseminated on the surface, or collected in the crevices of other mercurial ores, and in marlite, calcareous spar, or other fossils. It has the lustre, opacity, fluidity, and other qualities of the pure metal; but, owing to the small quantity which is found of it, the quicksilver of commerce is usually obtained from cinnabar. This ore is red, varying in the shades of its colour, and in the degrees of its lustre. It occurs massive, disseminated, and crystallized: in the two former states always opaque, and in the latter translucent, or transparent. To obtain the metal, the ore, after being sorted, is reduced to powder, and mingled with about one fourth of quicklime also in powder. This mixture is put into large iron retorts, which are

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[1] Ὑδράργυρος Græcorum.

[2] This is the oldest and the richest mine of cinnabar in Europe. It was wrought by the Romans two thousand years ago; and yields about 6000 quintals of fluid mercury annually.

[3] These were discovered in 1566 and 1567, by Henry Garces, a Portuguese. Garces was a native of Porto, and went to Peru in the Spanish service. Examining one day the red earth which the Indians used as paint, and called *limpi*, he observed it was native cinnabar; and knowing that mercury was extracted from cinnabar in Europe, he began to work the Peruvian mines.

placed in a long furnace, and glass receivers adapted to each, but not luted until all the moisture it contains be driven off; the joinings of the vessels are then closely stopped with well-tempered clay, and a full red heat kept up for seven or eight hours, in which time the mercury is volatilized, and condensed in the receiver. About ten ounces of mercury are usually obtained from 100 lbs. of the ore.[1] We have no authentic information to enable us to fix the period when mercury was first known; but the Greeks were well acquainted with it; and Aristotle mentions a wooden Venus which moved by its means, probably on the same principle as the Chinese puppets, to which motion is given by means of mercury.[2]

Officinal. HYDRARGYRUM, *Lond. Edin. Dub.* Quicksilver. Strained Mercury.

Syn. Mercure coulant (*F.*). Vide *Hydrargyrum.*

A great part of the quicksilver which used to be brought to this country came from Austria in leather bags, containing 31 lbs. of the metal; they were packed in casks, two or three together in one cask. None of this kind is now imported: it all comes from Spain in iron bottles, which contain from 60 lbs. to 1 cwt. of mercury.[3] It is an exceedingly pure article. But mercury is occasionally adulterated with an admixture of lead, bismuth, zinc, or tin. When the metal quickly loses its lustre, is covered with a film, or is less fluid and mobile than usual, leaves a stain on a plate, or does not readily divide into round globules, but into those with tails, it may be suspected. In the London and Edinburgh Pharmacopœias, tests for ascertaining the purity of mercury are given, to the following effect: — It should volatalize completely, the globules should leave no trail when rolled on a sheet of paper, and pure sulphuric acid agitated with it evaporates when heated without leaving any residuum. Lead is discovered by shaking a portion of the suspected mercury in distilled water, then digesting in distilled vinegar, and adding to the solution water saturated with sulphuretted hydrogen gas, which gives a brown precipitate if lead be present; and by this means one part of lead may be detected in 15·260 of mercury. Bismuth is detected by pouring the nitric solution into distilled water, when the bismuth will appear as a white precipitate. Exposing the mercury to heat detects zinc; and tin is discovered by a weak nitro-muriatic solution of gold, which is precipitated purple by tin. It is purified by distillation with iron-filings, or by agitation in diluted sulphuric acid until the acid cease to become turbid;

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[1] *Aikin's Chemical Dictionary.*

[2] For the manner in which this is effected, see *Muschenbrock's Introd. in Phil. Nat.* i. p. 153.

[3] The quicksilver mines in Spain are at present in the hands of the Rothschilds; and the metal is, therefore, both a government and a private monopoly.

and then, after washing and drying the globules into which it has been divided, passing them through a pin-hole in the bottom of a funnel of writing paper.[1]

Qualities. — Pure mercury is inodorous, insipid, and of a bright white or silver colour. Its specific gravity is 13·568.[2] It is always fluid at the ordinary temperature of the atmosphere, but becomes a solid malleable metal in a degree of cold sufficient to sink the thermometer to — 39° Fahr., in which state its sp. gr. is 15·612.[3] It boils at 632°, and is volatilized unchanged in close vessels; but it is not capable of combustion in common air.[4] Mercury is oxidized by the air at its usual temperature, when subjected to agitation, and is fully saturated with oxygen at a continued heat of 600°. It is oxidized by and combines with sulphuric acid at a boiling heat, and with nitric acid at 60° Fahrenheit; and its oxides, which are two, a protoxide and a binoxide, enter into combinations with acids. It unites with chlorine, iodine, sulphur, phosphorus, and cyanogen; and combines with many metals, forming what are called amalgams. Its equivalent is 200·14, if the salts are considered to have the composition indicated by the pharmacopœial names; but many chemists regard its equivalent as 100·07, or half the first number.

Medical properties and uses. — Mercury in its metallic state exerts no action on the animal system. It has, nevertheless, been administered in doses of a pound or more with the view of operating mechanically, and overcoming by its weight the obstruction of the intestines which exists in ileus; but, as it cannot act by its gravity on the ascending part of the bowels, it is not easy to conceive how it should have been ever recommended; and the events of the cases in which it has been given have sufficiently proved the futility of the practice.

Mercury, however, when prepared for medicinal use, is a remedy of the most extensive application. It enters into the circulation, and excites powerfully the whole of the capillary system; increasing all the secretions and excretions, and has even been detected in the urine.[5] It has been supposed that it is peculiarly determined to the salivary glands; but if, as there is every reason to suppose, these glands are endowed with more irritability[6] than the rest of the habit, it is easy to conceive that the same degree of stimulus, which is operating on the whole system, will produce a greater

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[1] This method was invented by Professor Brunchi, of Pisa. Vide *Phil. Mag.* iv. p. 348.

[2] *Cavendish.*

[3] *Crichton, Phil. Mag.* xiv. 49.

[4] *Thomson's Chymistry,* i. 175. If, however, the galvanic fluid be passed through it, the beautiful luminous stars in which it is dispersed seem to prove its combustibility.

[5] *Mem. della Reale Acad. di Torino,* tom. xxix. p. 228.

[6] That the salivary glands and their excretories are very excitable, is evident from the flow of the saliva being much increased by affections of the mind, as the thinking of any kind of food which is particularly grateful to the taste.

effect on them in a direct ratio according to their greater susceptibility. But although the general action of the preparations of mercury is stimulant, yet they produce different effects, operating sometimes as stimulants, sometimes as cathartics, or emmenagogues, and locally as errhines: and hence the great variety of diseases in which mercurials have been found useful; as febrile affections, spasms, glandular obstructions, cutaneous eruptions, membranous inflammation, &c. (See *Preparations.*)

But the most important effect of the preparations of mercury is their specific operation in syphilis. They were used, and their effects, when accumulated in the habit, were known so early as the 13th century; and the writings of Theodorick[1] contains cautions against catching cold during the course; but the first notice of mercury as a remedy in lues venerea is contained in a tract by Jo. Almenar, a Spaniard, published in 1516, who recommends it after the manner of the Arabians, but condemns pushing the remedy so as to promote salivation. In a tract on Syphilis by Laurentius Phrisius, published in 1532[2], four formulæ of ointments in which mercury is an ingredient are given under the title of *Unguenta Empiricorum;* but it appears that it had been used as an external application, by regular practitioners, from the year 1527, at which time it was introduced by Berengarius, a surgeon at Carpo. Physicians, however, did not venture to give mercury internally till Paracelsus broke the fetters of ancient authority, and proved that it might be exhibited not only with safety but with advantage. Since his time, a period of nearly 300 years, experience has fully sanctioned its use: but although, as Mr. Pearson justly observes, "not one medicine besides, derived from the animal, vegetable, or mineral kingdom, has maintained its credit, with men actually employed in extensive practice, during a tenth part of that period[3];" yet it is remarkable, that in the present day its utility in syphilis has been questioned.[4] Many various theories of the operation of mercury have been advanced: the most satisfactory of which is that of Mr. Hunter, who supposed that the stimulant operation of the mercury induces and maintains an action which is incompatible with the morbid action produced by the venereal virus, until the poison is either destroyed, or evacuated from the body by the excretories. But, whatever may be the principles on which it operates, its efficacy in syphilis is certain, when it is judiciously and cautiously administered. The mode of giving it, and the morbid effects which it produces under certain circum-

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[1] He was a friar, afterwards bishop of Cervia, and died between the years 1270 and 1280. See *Friend's History of Physic*, ii. 360.

[2] *Epitome opusculi de curandis pustulis, ulceribus, et doloribus morbi Gallici, mali Frantzoss appellati, autore Laurentio Phrisio, artium et medicinæ doctore.*

[3] *Observations*, &c., p. 97.

[4] *Medico-Chirurg. Trans.* vol. ix.

stances, shall be mentioned when its preparations are described; it is only necessary to observe further in this place, that although men of the first medical talents have, occasionally, declaimed against its use[1], and although much mischief may have of late years arisen from its indiscriminate employment by the speculative and the ignorant, yet, in the hands of judicious and cautious practitioners, it will continue to rank as one of the most useful of the articles of the materia medica.

Officinal preparations. — *Hydrargyrum purum*, D. *Hydrargyrum cum Cretâ*, L. E. D. *Hydrargyrum cum Magnesia*, D. *Pilula Hydrargyri*, L. E. D.: together with certain Unguenta, Linimenta, and Emplastra.

HYOSCYAMUS.[2] *Spec. Plant. Willd.* i. 1010.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.

G. 378. *Corolla* funnel-shaped, obtuse. *Stamens* inclined. *Capsule* covered with a lid, two-celled.

Spec. 1. H. *niger*. Common Henbane. *Med. Bot. 3d. edit.* 204. *t.* 76. *Smith, Flor. Brit.* 598. *Eng. Bot.* 591. *Hayne*, i. 28.

Officinal. HYOSCYAMUS, *Lond. Edin. Dub.* The fresh and dried stalk-leaf of the biennial herb, *L.* The leaves, *E. D.*

Syn. Jusquiame (*F.*), Bilsenkraut (*G.*), Bilsenkruid (*Dutch*), Fandensnosser, Hensebane (*Dan.*), Nickota Velena (*Russ.*), Giusquiamo nero (*I.*), Beleno (*S.*), Yosciamo, Meimendro (*Port.*), Bolmort (*Swed.*), Bielun (*Pol.*), Khorassānie Ajooan (*H.*), Sickran (*Arab.*), Khorasanie omum (*Tam.*), Buzirulbunj (*Pers.*), Adas-pedas (*Malay*), Adas (*Jav.*).

Common henbane is an indigenous annual or biennial, frequent on waste grounds, and at the sides of roads, particularly on a calcareous soil, flowering in July and August. The root is long, tapering, compact, and fibrous; the stem erect, woody, round, and viscous, rising about three feet in height. The leaves are alternate, sessile, and embracing the stem; large, the lower ones being above a foot in length; deeply sinuated, undulated, woolly, and of a sea-green colour. The flowers are in terminal, recurved, leafy, simple spikes; and each is simple and erect. The calyx is permanent, pitcher-shaped, with a regular, five-cleft border reticulated with veins; the corolla dingy-straw-coloured, and beautifully pencilled with a net-work of purple veins. The filaments are inserted into the tube of the corolla, tapering, downy at the base, and supporting purple anthers. The style is purplish, with a blunt round stigma. The capsule is a globular pyxis, invested with the persistent calyx, bilocular, and closed with a convex smooth lid. It contains numerous small, irregular, brown seeds.[3]

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[1] *Saunders, Observations on the Hepatitis of India*, &c.

[2] Ὑος κυαμος, hog-bean.

[3] The seeds abound with oil, but they cannot be eaten with impunity. The roots,

The whole of the plant is covered with soft white hairs, feels clammy and slightly adhesive, and is poisonous when eaten.

Qualities. — The odour of the recent leaves is strong, somewhat fœtid, and narcotic[1]; and the taste mucilaginous and slightly acrid; but, when dry, they have scarcely either odour or taste. The virtues of the plant are completely extracted by diluted alcohol. The watery infusion is of a very pale yellow colour, and insipid; and has the narcotic odour of the plant. It is not altered by the acids. The alkalies change the colour to a deep greenish-yellow, which, on the addition of an acid, disappears, and a brownish, flocculent precipitate is produced. It is copiously precipitated by solutions of acetate of lead, white; by nitrate of silver, black; sulphate of iron strikes with it a pale olive colour, and a dark precipitate is slowly formed. MM. Meissner and Brandes have examined the nature of Hyoscyamus, and obtained an alkaloid, which they have named *Hyoscyamia,* and which they expect exists in combination with malic acid; a *fat oil, waxy fat; resin,* insoluble in ether; *uncrystallizable sugar; gum; fecula; albumen;* a *vegeto-animal matter; malates, sulphates, phosphates of lime,* and *chlorides* of *calcium, magnesium,* and *potassium.* The peculiar virtues and the poisonous properties of the plant depend on the presence of an alkaloid, called Hyoscyamia, which, however, is not such a body as was described by Brandes. The true Hyoscyamia was first obtained by Geiger and Hesse, and by them was found to have the following properties:—It occurs when pure in white crystalline needles, little soluble in water, more so in ether, but very soluble in alcohol; its solutions are alkaline, and it neutralises acids. It is precipitated from its solutions by tannic acid, and also by chloride of gold; it has been unsuccessfully sought for by many chemists, and none is able to be obtained in Europe at the present time. Hesse and Geiger state that the seeds contain it in larger quantities than the other parts of the plant. The acid contained in henbane is asserted to be malic, but there is much doubt on the point. An empyreumatic oil is procured by distilling the leaves without water.[2]

Medical properties and uses. — Henbane is narcotic. Its operation is somewhat to that of opium, increasing at first the strength of the pulse, and producing a like sense of heat; effects which are followed by proportional diminution of excitement, and sleep. In some habits it occasions diaphoresis or diuresis, and sometimes a rash, like scarlatina, or a pustular eruption; at other times it purges;

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which resemble parsnips, have occasionally been eaten, and fatal effects produced; although they are less active than the leaves. These roots, when moulded in the turning loom, and strung in the form of beads, are sold under the name of *Anodyne Necklaces,* and are worn by infants to allay the irritation of teething — a humiliating instance how deeply error is rooted in the human mind!

[1] In the recent state the odour of the leaves occasions stupor and delirium.

[2] Morriss, *Edin. Med. and Surg. Journ.* vol. xxxix. p. 379.

and, in over doses, produces sickness, stupor, dimness of sight, hard pulse, delirium, and coma, with dilatation of the pupils; until the pulse gradually becoming weak and tremulous, petechiæ make their appearance, and death ensues. Dissections show the effects of inflammation in the stomach, bowels, and the membranes of the brain. After an emetic is given, and the stomach fully cleared, vinegar is said to be the best antidote, but alkalies are preferable.

Although the effects of henbane as a narcotic and an anodyne were known to the ancients[1], yet they were ill understood, and the use of the drug was almost completely relinquished till the time of Baron Stoerck, who may be regarded as having introduced it into practice. It may be employed in all the cases in which the use of opium is indicated, where the latter disagrees with the habit, or where its constipating effect is wished to be avoided. In painful and spasmodic affections, hysteria, rheumatism, and gout, much benefit has resulted from its use; and we have found that it is particularly serviceable, when united with colocynth or other powerful cathartics, in colica pictonum; it allays griping and augments the action of the cathartic. We have long employed it, with decided advantage, in mania, in combination with camphor. It is used externally to lessen and allay the irritation of very sensible parts; hence fomentations of the leaves have been found serviceable in scrofulous and cancerous ulcers, hæmorrhoids, and other painful swellings; and Hufeland recommends the leaves and marshmallow flowers boiled in milk, with the addition of a few grains of acetate of lead, as a topical application in scrofulous ophthalmia. Smoking the leaves, like tobacco, is said to allay the pain of toothache. Its effects in dilating the pupil, when an infusion of it is dropped into the eye, are similar to those of belladonna, and hence it is sometimes employed as a preparative to the operation for cataract. It is used, generally, in the forms of extract and tincture; but it should not be prescribed in combination with alkalies, as these destroy its narcotic powers in twenty-four hours.

The leaves boiled in olive-oil form a useful topical anodyne, employed on the continent under the name *Oleum Hyoscyami Coctum.*

Officinal preparations. — *Extractum Hyoscyami,* L. E. D. *Tinctura Hyoscyami,* L. E. D.

ICHTHYOCOLLA. *Lond. Appendix.*

This substance is now put into the Appendix to the London Pharmacopœia, for the purpose of distinguishing gallic from tannic acid, &c. It is, however, frequently employed in disease as a nutrient rather than as a medicine. The sounds of the perch,

[1] "Hyosciamus in potu cibove sumptus, qualem ebriorum mentis alienationem infert." — *Dioscorid. Alexif.* xv. 407.

some species of cod, and of a few other fishes found in the waters of this island and upon its coast, affords isinglass. The sturgeons, Acipenser Sturio, A. Ruthenus, A. Güldenstadii, A. Stellatus, and A. Huso, from which the best is prepared, are caught in the rivers of Russia, in the Nile, and in the Caspian Sea, and occasionally in those of this country.

Isinglass is the prepared sound, or swimming bladder. It is taken from the fish, slit open, well washed and freed from the thin membrane which covers it; then beaten, exposed to stiffen a little in the air, rolled, and fixed in a peculiar shape, by means of wooden pegs, or folded into leaves like a book, or simply dried without any care. The best isinglass is generally that which is rolled up, and called *Staple;* the next best is the *Book Isinglass:* there are inferior kinds, which are chiefly used to adulterate the better. Isinglass is also imported from the Brazils, the United States of America, Hudson's Bay, and the East Indies.

Qualities. — Good isinglass should be dry, whitish, semi-pellucid and inodorous: 100 grains of it should yield 98 grains of matter soluble in water, which is *gelatine,* and scarcely two grains of insoluble matter, consisting chiefly of phosphate of lime. Its use as a test will be given in Pharmacopœia Appendix.

Medical properties and uses. — Isinglass was formerly considered as a lubricating remedy, but its value as such is very slight. It is used only as a nutrient.

INDIGO. *Lond. Appendix.* *See* Pharmacopœia, Appendix.

INULA. *Spec. Plant. Willd.* iii. 2089.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. ord.* Asteraceæ. Compositæ.

G. 1489. *Receptacle* naked. *Pappus* simple. *Anthers* ending in two bristles at the base.

Species. I. *Helenium.* Elecampane. *Med. Bot. 3d. edit.* 64. *t.* 26. *Smith, Flora Brit.* 890. *Flora Danica, t.* 728. *Hayne,* vi. 45.

Officinal. INULA, *Lond.* Elecampane. Root of Inula Helenium.

Syn. Aunée, Inula Laleniere (*F.*), Alantwurzel (*G.*), Gewoon Alant (*Dutch*), Alandsrot (*Swed.*), Alandsrod (*Dan.*), Omanowy (*Pol.*), Sanet-Ellensrod Deviasil (*Russ.*), Elenio; Enula Campana (*I.*), Enula Campana (*S. Port.*), Usululrason (*Arab.*), Beykzunjebulshamee (*Pers.*).

This species of Inula is an indigenous perennial, found occasionally in pastures and rich moist soils[1], flowering in July and August, and ripening its seed in September. The root is thick, branched, externally of a brown or grey colour, and internally white. The stem, which rises about three feet in height, is leafy,

[1] Ἑλένιον Dioscoridis. It is not unfrequent in Essex. — *Hudson.* Between Worcester and Ludlow, and Bishop's Castle and Newton. — *Smith.* I have seen it near Ewell, Surrey.

round, and furrowed; branched near the top, and villous. The leaves are large, ovate, serrated, veined, of a deep green colour on the upper surface; and on the under, reticulated, tomentose, and whitish: the radical ones are petiolate, but those of the stem sessile and embracing. The flowers are terminal, solitary, large, and of a golden colour. The calyx is scaly: the exterior scales are large, ovate, imbricated, and externally tomentose; the interior are narrow, linear, equal, and chaffy. The florets of the ray are numerous, spreading, twice the length of the calyx, linear, with the apex tridentate. The anthers end in two bristles at the base. The seeds are quadrangular, smooth, slightly curved, and furnished with a somewhat chaffy pappus. The receptacle is reticulate and papillous.

The roots of elecampane found in the shops are generally obtained from garden plants. They consist of oblong or transverse slices. They are fit for use in the second year of their growth; and at this age are preferable to the older roots, which become stringy and woody. They should be dug up in autumn.

Qualities. — Elecampane root when dry has an aromatic yet slightly unpleasant odour; and, when chewed, the taste is at first disagreeable, glutinous, and in some degree resembles that of rancid soap; then aromatic and bitter. According to the analysis of Funke[1], elecampane contains, 1. *a volatile oil*, which crystallizes; 2. *a peculiar fecula* (*Inulin?*); 3. *extractive matter;* 4. *free acetic acid;* 5. *resin;* 6. *albumen;* 7. *fibrous matter.* Both water and alcohol extract its virtues: the tincture possessing more of the bitterness and pungency of the root than the watery infusion. The decoction, after standing some hours, deposits a white powder resembling starch in appearance; but its properties show it to be a distinct principle; and it has, therefore, been named *Inulin.*[2] Inulin resembles starch, but differs from it in being slightly soluble in cold water, and being tinged yellow by iodine. It is very soluble in hot water; but it is deposited as the water cools. It dissolves, also, in boiling alcohol. Its formula is $C_{24}\ H_{21}\ O_{21}$. In distillation with water, this root yields a species of camphor named *Helenin:* its formula, according to Gerhardt, is $C_{15}\ H_{10}\ O_2$.

Helenin may be readily procured by exhausting the coarsely powdered root with strong spirit, and then diluting this tincture with about five times its volume of water: after twenty-four hours the *helenin* crystallizes out in tufts composed of long needles.

Medical properties and uses. — Elecampane is usually ranked as a tonic; and supposed to possess deobstruent, diuretic, and expec-

[1] *Tromsdorff's Journ.* xviii. 1. p. 74.

[2] This substance, which was first noticed and its properties investigated by Rose, was named by Dr. Thomson, *System of Chymistry,* 4th edit. iv. 697.

torant properties. It was formerly regarded as a remedy of great efficacy in dyspeptic affections, flatulencies, palsy, dropsies, uterine obstructions, and pulmonary complaints; but Cullen observed, that its diuretic powers were trifling; and could not discover that it possessed any expectorant properties.[1] It is scarcely ever used by the regular practitioner. The dose of the powdered root may be from ℈j. to ʒj.

It is contained in *Confectio Piperis*, L.

IODINEUM. *Iodine.*

Officinal. IODINIUM, *Lond. Dub.* IODINEUM, *Edin.* Iodine.

Syn. Iode (*F.*), Iod (*G.*), Iodina (*I.*).

This element exists in a great number of marine plants; namely, in Fucus *vesiculosus*, F. *serratus*, F. *nodosus*; in Porphyra *umbilicalis*, Padina *pavonia*, Ulva *linza*; Laminaria *saccharina* and L. *digitata*, Chorda *filum*; Gelidium *cartilageneum*; Halyseris *polypodioides*; Phyllophora *rubens*; Rhodomenia *palmata*, and many of the marine Confervæ: it has been found also in many fresh-water plants; in some ores; in sea water in combination with sodium; in many mineral waters[2]; and in the rock salt of the Tyrol; in sponges, in the envelopes of the eggs of the Cuttle fish and in cod-liver oil.[3] It was discovered in 1812 by M. Curtois, a manufacturer of saltpetre in Paris, and soon occupied the attention of many chemists, and its real nature was determined by Gay Lussac and Sir H. Davy. The greatest part of the iodine used in this country is made at Glasgow. Dr. Wollaston pointed out the following method of procuring it.

Digest kelp[4] in water, as long as any soluble matter is taken up; then evaporate the solution, to separate by repeated crystallizations all the salts of soda which it contains, and to leave in the mother liquor the soluble iodides. To the mother liquor add cautiously sulphuric acid in excess; then boil for some time, and leave the whole at rest. Sulphur is deposited, and sulphuretted hydrogen and sulphurous acid gases are evolved. Decant off the clear fluid, introduce it into a leaden retort, and add as much of the black oxide of manganese as there has been sulphuric acid employed. On distilling this mixture, the iodine comes over in beautiful violet-coloured vapours[5], which condense in the receiver in the form of brilliant, blackish, or rather bluish-grey scales. The iodine is afterwards purified by mixing it in a retort with a little water and

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[1] *Mat. Med.* ii. 459.

[2] Those of Bonnington; Robin's well at Leamington Priors; the old well at Cheltenham; the sulphureous waters of Nuovo d'Asti.

[3] *Annalem der Pharm.* xxi. cap. i. p. 73.; also *Journ. de Pharm.* Feb. 1840.

[4] French kelp affords less iodine than British kelp; but the Cape of Good Hope kelp yields still more than the British.

[5] Whence its name, from *ἰώδης*, violet-coloured.

$\frac{5}{100}$ parts of potassa; then distilling in a sand bath, condensing the vapours in a very cool, large receiver, and drying the iodine by pressing it between folds of bibulous paper. It ought to be kept in glass-stoppered bottles. The theory of the process is simple. The peroxide of manganese decomposes the iodides contained in the mother liquor, setting the iodine free, which distils over; whilst the sulphuric acid, which was necessary for decomposing the carbonates, &c., forms sulphates of the salts and the oxide of manganese, and is left in the still. The manganese is not essential to the process.

Qualities. — Iodine, as has already been stated, is procured in the form of scales of a metallic lustre, a bluish-grey colour, and having an acrid taste, and the odour somewhat like chlorine. It may also be obtained in crystals, the primitive form of which is a rhombic octahedron. Its sp. gr. is 4·948. It tinges the skin yellow. It melts at 225° Fahr., and at 347° volatilizes; and when moisture is present, this occurs even at low temperatures; the vapour having a rich violet colour and a sp. gr. of 8·716. It is a non-conductor of electricity. It is soluble in 7000 of water, colouring the fluid orange-yellow, is more soluble in alcohol, and still more so in ether and chloroform. It unites with the metals and many simple bodies, and also forms compounds with the vegetable alkalies, Strychnia, Brucia, Cinchonia, Quina, and Codeia, &c. With oxygen it forms iodic and hyperiodic acids, with hydrogen hydriodic acid. Dissolved in alcohol it forms a tincture which is employed in medicine, and as a test of the presence of starch, with which it forms *Iodide of Amidine,* which has a beautiful blue colour. Starch is so delicate a test for iodine, that, according to M. Gaultier de Claubry, it detects it in solutions in which the proportion of the iodine does not exceed $\frac{1}{450000}$ of the liquid.[1] The atomic weight of iodine is 126·36.

Iodine is sometimes adulterated with water, black oxide of manganese and charcoal. To detect the two latter, M. Robiquet directs the mixture to be submitted to sublimation; and the residue weighed: it may also be detected by dissolving the suspected iodine in alcohol, and ascertaining the weight of the residue. The iodine of commerce contains generally about 12 parts in 100 of water, which should be separated before the iodine is used for making the tincture. The adulteration with water is detected by pressing the specimen between bibulous paper.

In the London Pharmacopœia the following are the properties given of iodine: "is black, has a metallic lustre, and resembles

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[1] Heat destroys this test, and the presence of the alkalies renders it nugatory. I discovered that the iodine in the iodides, and hydriodates, is instantly set free by pouring over them chlorine gas; and then starch displays its presence. This is a test for it in all mixed fluids.

chlorine in odour. On applying heat to it, it first liquefies, and then sublimes in violet-coloured vapour. It is dissolved in rectified spirit. This solution colours starch blue. Thirty-nine grains of iodine dissolved in three ounces of water by a gentle heat, with nine grains of lime, turn the solution a yellow or brownish colour."

In the Edinburgh Pharmacopœia similar properties are given: and it is ordered to be dried before use, by placing it in a shallow basin of earthenware in a small confined space of air, with ten or twelve times its weight of fresh-burnt lime, till it scarcely adheres to the inside of a dry bottle.

The Dublin College orders the iodine of commerce to be sublimed to form Iodinium Purum. *See* Part III.

Medical properties and uses. — Iodine operates as a stimulant, acting topically, and also entering the system, exciting powerfully the capillaries. It has been successfully employed in bronchocele, swelled testicle, scrofula, and other glandular swellings; and has succeeded in reducing enlargements of the liver and spleen when mercury has failed. It has also been administered in paralysis, with variable success; and Dr. Baron, Lugol, and others, have used it with benefit in ascites. Like foxglove, it does not act while the abdomen is tense, and the absorbents are compressed by the fluids; but after tapping, and reducing excitement by bleeding, it completely removes the serum. The health is afterwards restored by tonics. On these grounds, I tried it in ovarian dropsy, after tapping; in two cases it so far succeeded, that the tumours have not again enlarged; but my hopes of its utility have not been realised. Its influence as an *emmenagogue* depends on the uterus sharing the excitement it induces. Cases are also recorded in which iodine has cured chorea, after arsenic and carbonate of iron had failed.[1]

With regard to the *modus operandi* of iodine, it is evident that it enters the circulation, and affects the whole capillary system, as during its operation in diminishing diseased glands the healthy glands are also affected. I have detected it, by gaseous chlorine, in the urine of patients, where the dose of the tincture has been carried to the extent of fifteen drops only twice a day; and its presence may be recognised in all the secretions. Endeavouring to clear this point by experiments on dogs, although the iodine was detected in the urine, yet I could not perceive the least trace of it in the chyle.

The use of iodine is sometimes productive of bad effects. When it has been taken daily for a long time, it is apt to excite inflammatory gastric dyspepsia: salivation has occurred during its use. It also may cause reduction of strength, by producing a change in

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[1] *Medical Gazette*, vol. i. p. 55.

the blood; and by diminishing nutrition. It has caused great disturbance of the nervous system, namely, paralysis agitans, profuse perspirations, pains of stomach and bowels, nausea, purging, vertigo, and headaches: absorption of the mammæ, wasting of the testicles, and general emaciation have also followed its use. When these systoms occur, it should be either intermitted or relinquished. In large doses it operates as an irritant poison.

Iodine is equally useful, whether internally exhibited, or externally applied. It produces much advantage as a topical application in porrigo scutellata, rubbed in upon the affected parts, and the scalp afterwards dressed with spermaceti ointment, which must be frequently renewed. The tincture is a useful application in effusions into joints, when pencilled over the enlarged joint. As an internal medicine, it is most commonly given in the form of tincture; as an external application, besides the tincture, the iodine may be formed into an ointment. It has also been employed in the form of vapour, inhaled into the lungs, in tubercular phthisis. It augments the secretion of the bronchial mucus.

Officinal preparations.—*Liquor Potassii Iodidi compositus*, L. D. *Iodinei Liquor compositus*, E. *Tinctura Iodinii composita*, L. D. *Tinctura Iodinei*, E. *Unguentum Iodinii compositum*, L. D. *Unguentum Iodinei*, E.

IPECACUANHA See *Cephaelis.*

JALAPA. See *Convolvulus.*

JANIPHA or JATROPHA MANIHOT. See *Tapioca.*

JUNIPERUS. *Spec. Plant. Willd.* iv. 851.

Cl. 22. *Ord.* 13. Diœcia Monadelphia. *Nat. ord.* Coniferæ.

G. 1841. Male. *Amentum* ovate. *Calyx* a scale. *Corolla* none. *Stamens* three.—Female. *Calyx* three-parted. *Petals* three. *Styles* three. *Berry* three-sided, irregular, with the three tubercles of the calyx.

Species 6. J. *Sabina.* Savine. *Med. Bot. 3d edit.* 10. *t.* 5.

Species 10. J. *communis.* Common Juniper. *Med. Bot. 3d edit.* 13. *t.* 6. *Smith, Flora Brit.* 1085. *Eng. Bot.* 1130.

1. JUNIPERUS SABINA.[1]

Officinal. SABINA, *Lond. Edin. Dub.* Savine-tops (recent and dried), *L.*

Syn. Savinier (*F.*), Sadebaum, Sagebaum (*G.*), Sevenboom (*Dutch*), Safvenboom (*Swed.*), Svebom (*Dan.*), Savina (*I.*), Sabina (*S.*), Moggevelnickdonskoi (*Russ.*).

This shrub is a native of Siberia, and Tartary, and the Levant;

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[1] Βραθυς Dioscoridis. There are two varieties of savine; the variety β is our plant.

but it has been long cultivated in our gardens, flowering in April, May, and June. It is an evergreen, seldom rising above three feet in height in this country, but, in Tartary, it attains fifteen feet; is covered with a brown bark, and divided into numerous branches, which are completely invested with very small, erect, firm, opposite, pointed leaves of a bright green colour, that lie over one another in four rows, and terminate the branches in sharp points, giving the whole shrub a very lively aspect. The *male* and *female* flowers are on different plants. The *male* catkin consists of three opposite flowers placed in a triple row, and a tenth flower at the end: and at the base of each flower is a broad scale fixed laterally to a columnar pedicel. There are filaments in the terminal flower only; tapering and united at the base, with simple anthers, which are sessile in the lateral flowers. In the *female* flowers, the calyx consists of three permanent scales; the petals are stiff, sharp, and also permanent; and the germen supports three styles with simple stigmas. The fruit is a spurious fleshy berry of a blackish-purple colour; marked with tubercles, the vestiges of the calx and petals, and containing three, small, hard seeds. The officinal parts are the young tops, which should be collected in May.

Qualities. — The leaves and tops of savine have a strong, heavy, disagreeable odour, and a bitter, hot taste, with a considerable degree of acrimony. These qualities depend on a volatile oil, which is obtained in considerable quantity by distillation with water. It is pale yellow, and possesses the odour and taste of the plant in an eminent degree. Both water and alcohol extract the active principles of savine; and Lewis found that, "on inspissating the spirituous tincture, there remains an extract consisting of two distinct substances; of which one is yellow, unctuous or oily, bitterish, and very pungent; the other black, resinous, tenacious, less pungent and subastringent."[1] The aqueous infusion strikes a deep-green with solution of proto-sulphate of iron. According to Gardes[2], its components are *volatile oil, resin, gallic acid, extractive salts of lime, chlorophylle,* and *lignin.*

Savine in coarse powder may be discovered by the aid of the microscope: the circular pores characteristic of plants of the Gymnosperms will be seen on the woody fibre. Savine in powder can be detected by the green colour, along with the peculiar odour depending on the volatile oil above alluded to.

Medical properties and uses. — Savine is a powerful local and general stimulant, possessing diaphoretic, emmenagogue, and anthelmintic properties. It has certainly a considerable effect on the uterine system; but, on account of its stimulating properties, is suited to those cases only of amenorrhœa which are unattended by

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[1] *Mat. Medica.*

[2] *Journ. de Chim. Med.* iii. 331.

fever, and in which the circulation is languid. In plethoric habits its use should be preceded by repeated bleedings[1]; and at all times its internal administration requires caution: many cases of its fatal influence being on record. Dr. Pereira regards savine as the most certain and powerful emmenagogue in the Materia Medica; and he also states that he has never found any ill effect arise from its administration. It has frequently been taken to cause criminal abortion; but it is always at the risk of the life of the woman. It has been given in gout, in chronic rheumatism, and in worm cases also, but it is seldom prescribed. As an external local stimulant or escharotic, the dried leaves in powder are applied to warts, flabby ulcers, and carious bones; and the expressed juice diluted, or an infusion of the tops, as a lotion to grangrenous sores, scabies, and tinea capitis; or mixed with lard and wax as an issue-ointment. The dried are much less active than the recent leaves: but it is, nevertheless, administered in powder. The dose of the powdered leaves is from grs v. to grs. xv. two or three times a day.

Officinal preparations.—*Oleum Sabinæ,* E. D. *Ceratum Sabinæ,* E. *Unguentum Sabinæ,* L. D.

2. JUNIPERUS COMMUNIS.[2]

Officinal. JUNIPERI FRUCTUS ET OLEUM, *Lond.* CACUMINA FRUCTUS ET OLEUM, *Edin.* Tops and fruit, *Dub.* Juniper berries, tops and oil (English oil, *L.*).

Syn. Genevrier ordinaire (*F.*), Wachholderbeeren (*G.*), Sevenbuom; Jenever (*Dutch*), Svebom (*Dan.*), En (*Swed.*), Ginepro (*I.*), Enebro (*S.*), Zimbro (*Port.*), Mojjevelnik obiknovennoi; Beresk (*Russ.*), Caw-caw-ynew muna (*Cree Indian*).

The common juniper is indigenous, growing on heaths and chalky hills, and flowering in May. It is a branching, rigid, smooth, evergreen shrub; but when planted in a good soil, it rises to fifteen feet in height. The leaves are very numerous, narrow, entire, sharply-pointed, channelled, of a glaucous colour on the upper surface, and sessile, standing in ternaries. The catkins are axillary, sessile, solitary, ovate, small, and furnished with bracts: the male flowers are yellow at first, and afterwards brown, with great abundance of pollen; the female are smaller, and of a yellowish green colour. The fruit, which is a cone, is globular, in colour blackish-purple with a glaucous bloom; and is composed of the scales of the amentum, which become fleshy and coalesce. The seeds are three, and angular.[3]

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[1] Home, *Clinical Experiments,* 387.

[2] 'Αρκευθος μικρα Dioscoridis.

[3] The resinous substance known by the name of Sandarach, which is brought from Morocco, exudes from the stem of the juniper in warm climates. The plant is liable to be attacked by a minute fungus, Hysterium *Juniperi,* which destroys the leaves and greatly injures the fruit.

The fruit requires to remain two years on the tree before it is fully ripe. The greater quantity of juniper berries, as the fruit is termed, used in Britain, is brought from Germany, Holland, and Italy. Some are brought from Greece, but they are the fruit of I. *Oxycedrus.*[1] The Italian fruit is less shrivelled, and has a fresher and more beautiful bloom upon it than the German, and is therefore generally preferred. It is imported in bags.[2] The tops are also officinal.

Qualities. — The fruit of the juniper has a peculiar aromatic odour, and a sweetish, pungent, bitterish taste, when chewed. In distillation with water it yields a volatile, terebinthinate oil of a greenish colour, on which its virtues depend.[3] Both water and alcohol extract its active properties. The principal constituents are *saccharine matter*, and *volatile oil* and *resin.* Tromsdorff analysed this fruit, and procured of *volatile oil* 10 parts, *wax* 40 + *resin* 100 + *sugar, acetate* and *malate of lime* 338 + *mucus* 70 + *lignin,* and some other *saline matters* 350. The quantity of the volatile oil in this analysis was only 1 per cent.; but the usual quantity obtained is 2½ per cent. According to Votter and Dann, 21 lbs. of the fresh fruit yield ℥ xxvj. of clear oil. Every part of the plant yields the same oil. This oil resembles oil of turpentine both in its physical and chemical properties. Its density, when highly rectified, is 0·847; that of the ordinary oil is 0·855. Its formula is $C_{10}\ H_8$ or $C_{20}\ H_{16}$. The *tops* of juniper have a bitter, warm taste, and a terebinthinate odour.

Medical properties and uses. — Juniper-berries, as the fruit is termed, are stomachic and diuretic. Like oil of turpentine, they impart the odour of violets to the urine. They have been long known as a remedy in hydropic affections; but they cannot be depended on alone, although they form an excellent adjunct to foxglove and squill. The tops are also used. They have been recommended in scorbutic and cutaneous affections; and Rosenstein asserts that a strong decoction of them soon clears the hands in scabies. The fruit is sometimes given in substance, triturated with sugar or a neutral salt: but the best form is that of infusion, made with ℥ iij. of the bruised fruit, and Oj. of boiling water. The dose of the first preparation is from ℈ j. to ʒ ss.; that of the infusion a teacupful every three or four hours.

Officinal preparations. — *Oleum Juniperi,* E. D. *Spiritus Juniperi compositus,* L. E. D.

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[1] *Sibthorp.*

[2] The quantity annually imported into the United Kingdom is about 800 tons.

[3] The flavour and diuretic properties of Hollands depend on this oil. English gin is flavoured by oil of turpentine.

JUNIPERI ET SABINÆ OLEUM. *Lond.* See Part III.

KINO. See *Pterocarpus.*

KOUSSO, KOSSO, COUSSO, COSSO.—The flowers, &c. of Brayera Anthelmintica.[1]

Brayera. *Nat. ord.* Rosaceæ.

G. *Calyx* turbinate, with a double five-parted limb. *Petals* resembling scales. *Carpels* two, one to two-seeded. *Stigmas* peltate. *Seeds* solitary, pendulous.

Species. Brayera *Anthelmintica* (Kunth).

A tree; peduncles branched, covered with short hairs; flowers in fours; bracts roundish. (Leaves unknown.) *Lindley, Medical Botany.*

This tree grows in Abyssinia, on elevated ground: it is usually about twenty feet in height; and the drug (kousso), which consists of the dried flower tops or inflorescence, is sent packed and compressed in boxes.

Qualities. — Kousso, as it occurs in the mass, has a yellowish-green colour, in which appear the purple edges of the petals of the flower: the odour is peculiar and pleasant. Dr. Pereira compares it to the mixed odour of the leaves of senna, tea, and hops. Its taste is slight, but a little acrid. On account of its very high price kousso is very liable to adulteration. Dr. Pereira recommends that it should not be bought in the state of powder, but when the dried flowers are in an entire state. The analysis made of kousso as yet have thrown but little light upon the subject. Wiltstein found in it two kinds of tannin, one striking a green, the other a blue colour, with iron, an acrid resin, together with chlorophylle, fatty matters, sugar, gum, lignin, and salts. Martin found in it a crystallizable substance, which he named *Kouseine,* soluble in alcohol and ether, and having a styptic taste. A small amount of volatile oil is also present in kousso.

Medical properties and uses. — This drug has been, for a long time held in great estimation in Abyssinia as an anthelmintic, especially for the expulsion of tape worm. It has recently been introduced into England, but has been used in some parts of Europe for some twenty or thirty years, especially at Constantinople, by Dr. Brayer, who, in 1823, published a treatise on it at Paris; and it was named, by Kunth, Brayera Anthelmintica, in honour of this physician. When taken into the stomach it does not commonly produce any very evident symptoms; sometimes it causes

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[1] For a full account of the history, pharmacography, chemistry, &c. of kousso, see *Pharmaceutical Journal,* vol. x. p. 15, wherein is contained a very valuable communication on the subject by Dr. Pereira, embracing all that is known concerning this drug.

slight nausea and thirst, occasionally vomiting; it also not unfrequently operates as a slight purgative. Although it acts so slightly on the healthy subject, yet in cases where certain entozoa are present, its powers become very manifest. It seems to possess the property of destroying these, and hence allows them to be readily expelled either by the purgative effect of the medicine itself, or by means of a cathartic subsequently administered.

Many cases have been related both in this country and abroad of the efficacy of kousso as an anthelmintic, for the expulsion of tape worm, and other kinds of intestinal entozoa; but several instances have occurred in which the patients, after a few months, have again suffered from the affection. The efficacy of kousso compared with other anthelmintics is still *sub judice.* Kousso is generally administered in the following manner. Half an ounce of the powdered flowers are to be mixed with luke-warm water, and infused for about a quarter of an hour in 10 ounces of water, for an adult. A little lemon juice is then to be swallowed, and the infusion being stirred up, the whole (both liquid and solid) is to be swallowed at two or three draughts, at short intervals, being washed down with cold water and lemon juice. To promote the operation, tea (without sugar or milk) may be taken. In three or four hours, if the bowels have not operated, a dose of castor oil or a saline purgative, should be administered. When given to children, a smaller dose may be used, from a drachm upwards.

KRAMERIA. *Flora Peruv.* tom. i. p. 61.

Cl. 4. *Ord.* 1. Tetrandria Monogynia. *Nat. ord.* Polygalaceæ.

G. 253. *Calyx* none. *Corolla* four petals: the superior *nectary* three-parted; and inferior two-leaved.[1] *Berry* dry, echinated, and containing one seed.

Species 1. K. *triandra.* Triandrous Krameria. *Ruiz Flor. Peruv.* tom. i. p. 61. *Icon.* xciii. *Woodville's Med. Bot. 3d. edit.* vol. v. p. 129. *t. Hayne,* viii. 14.

Officinal. KRAMERIA, *Lond. Edin. Dub.* Krameria or Ratanhy Root.

Syn. Ratanhie (*F.*), Ruiz para los dientes (*S.*), Ratanhia (*Huanaco*), Mapato (*Tarma*).

This plant is a native of Peru, growing on the argillaceous, sandy, and arid acclivities of the mountains in the provinces of Huanuco, Tarma, Canta, Xauxa, Caxtambo, and Huamalies, and very abundantly near the city of Huanuco.[2] It was also found by

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[1] This part of Willdenow's character applies solely to *K. ixina*, the *pentapetala* of the *Flora Peruviana,* the only species which he describes. The name *Ratanhia* signifies trailing plant.

[2] It was first noticed by Ruiz in 1780 in the province of Tarma.

Humboldt in the province of Guancabunba in Peru. It flowers throughout the year; but is in the height of blossom in October and November. It is a shrub, with very long, much branched, spreading roots, of a blackish-red colour exteriorly, red interiorly, and having a bitter, styptic taste. The stem is procumbent, round, and divided into numerous branches, which when young are white and silky, but as they increase in age they become naked below, and acquire a black colour. The leaves are sparse, sessile, oblong-obovate, pointed, entire, and covered with a white silky pubescence on both surfaces. The flowers are terminal, solitary, and pedunculated. The corolla, for there is no calyx, is subpapilionaceous, consisting of four lake-coloured petals, the inferior larger than the others, seriaceous externally, but internally smooth and shining: the nectary is tetraphyllous, the two upper leaflets being spathulate, the two lower roundish, concave, and scale-like. The stamens are three, each composed of a flesh-coloured filament, inserted between the germen and the superior leaflets of the nectary, and an urceolate anther, terminated with a pencil of very short hairs, and perforated with two holes at the apex. The style is red, awl-shaped, supporting a simple stigma, and seated on an ovate germen, which changes to a dry, hirsute drupe.

Ratanhy-root is collected for medicinal purposes after the rains. As imported, it consists of pieces of various sizes; but seldom exceeding an inch in thickness, much branched, and the extreme ramifications minute. The root breaks short, exhibiting in the fracture a woody centre, and an easily separable, fibrous, dark-red bark. The thinner pieces are the best, as the proportion of bark is greater, compared with the woody centre, than on the thicker pieces. An extract of ratanhy is sometimes imported.

Qualities. — The bark of ratanhy-root, when chewed, tastes bitter, astringent, and at first nauseous; but the impression left in the mouth is sweetish and astringent, not unlike that produced by catechu. The woody centre is nearly insipid, and inert as a remedy. Ratanhy-root yields its properties partly to cold and wholly to boiling water, affording a dark-brown infusion, which emits an odour not unlike that of a raw potatoe: the infusion tastes astringent, and is very bitter. All the mineral acids throw down copious precipitates when added to the infusion, but no precipitate is caused by acetic, citric, or oxalic acid. The pure alkalies produce no precipitate, but deepen the colour of the infusion to a rich claret-brown. Lime-water throws down a very copious pinkish precipitate, which is soluble in hydrochloric acid. Solutions of sulphate of iron strikes a dark greenish-grey colour with the infusion; that of acetate of lead throws down a pale brown precipitate, leaving the iufusion nearly colourless and limpid; and tincture of iodine, a deep blue colour. Solution of isinglass

also throws down a tannate. Alcohol produces no effect on the infusion.

Ratanhy-root digested in alcohol yields a deep, reddish-brown tincture, which, when evaporated, leaves a deep red, brittle resin.[1] When this tincture is poured into water, it throws down the resin of a pink colour. In ether the tincture is less deep-coloured; and, when the ethereal tincture is evaporated on water, it leaves a pellicle of dark red resin on the surface, and a small quantity of extractive is diffused through the water, colouring it a light brown. From these experiments we may conclude, that the bark of ratanhy-root contains a large proportion of *tannic acid, gum, fecula,* and *resin.* Vogel states, that he found the constituents of 100 parts of the root to be 40·00 of a *peculiar red astringent principle,* 1·50 of *mucilage,* 0·50 *starch,* 48·00 *fibrine,* and 10·00 of *water and loss.* Peschier, who analysed the bark at a more recent period than Vogel, states the following to be its constituents, 42·6 of *tannic acid,* 0·3 *gallic acid,* 36·7 *gum, extractive* and *colouring matter,* 0·4 *krameric acid* = 100·0. In 100 parts of the root he found 31·25 of soluble watery extract.[2] An extract made with cold water is of a reddish-brown colour, has a vitreous fracture, and the bitterness and astringency of the root: it is best prepared with alcohol.

Medical properties and uses. — Ratanhy-root is powerfully astringent. It has been long esteemed in Peru as a remedy in dysentery attended with bloody stools; as a detergent in ulceration of the gums, and a stomachic corroborant. It is also employed for fixing the teeth, when they become loosened by the receding of the gums[3]; and for giving a fine red colour to the gums and lips. It is powerfully styptic when applied to wounds, and on this account has been used in internal hæmorrhages, particularly hæmaturia. Alibert states that it has been used with success in France, in cases of leucorrhæa. It has not been so long known in Great Britain as a medicine, as it has been known to those who manufacture port wine; and large quantities of its extract are prepared solely for this purpose in South America. It is certainly a valuable addition to the Materia Medica, in intermittents, diarrhœas, hæmorrhages, and all cases in which astringents are indicated. It has also been found useful in chronic rheumatism; in gastrodynia, attended by dyspepsia, headache, and vertigo; and in all diseases of the digestive organs, in which the powers of the stomach are impaired. When there is great debility of the nervous system, it operates as power-

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[1] A saturated tincture of the root in brandy is called wine-colouring; and is used in Portugal to give roughness to port wines.

[2] *Gmelin, Handb. d. Chem.* ii. 125.

[3] An excellent tooth-powder may be composed by mixing one part of finely powdered ratanhy-root with three parts of powdered charcoal.

fully and more immediately than the cinchona bark; whilst, in cases of general asthenia, its invigorating effects are very evident. Ratanhy-root may be exhibited in substance, or in the form of *extract*, or *infusion* and *decoction*. The dose in substance is from grs. x. to ʒ ss. The extract and the infusion are now officinal. The decoction is a bad form of preparation, as tannate of starch, which is insoluble in cold water and inert, is formed, and falls as the decoction cools. On the Continent it is exhibited in the form of tincture, made by digesting for twelve days ℥iij. of the powdered root with ℥ij. of orange-peel, ℥ss. of serpentaria root, and ʒ j. of saffron, in O ij. of rectified spirit of wine. The imported extract is also used.

Officinal preparations.—*Infusum Krameriæ*, L. D. *Extractum Krameriæ*, E. *Tinctura Krameriæ*, D.

LACMUS. See *Rocella.*

LACTUCA. *Spec. Plant. Willd.* iii. 1523.

Cl. 19. *Ord.* 1. Syngenesia æqualis. *Nat. ord.* Chicoraceæ.
G. 1404. *Receptacle* naked. *Calyx* imbricate, cylindrical, with a membranous margin. *Pappus* simple, stipitate. *Seed* even.
Species 1. L. *sativa.* Garden Lettuce. *Blackwell, t.* 8. *Hayne,* vii. 30.
Species 12. L. *virosa.* Strong-scented Lettuce. *Med. Bot. 3d edit.* 75. *t.* 31. *Smith, Flora Brit.* 819. *Hayne,* v. 47.

1. LACTUCA SATIVA.[1]

Officinal. LACTUCA SATIVA, *Lond. Dub.* LACTUCA VIROSA, *Dub.* LACTUCARIUM, *Edin. Dub.* The herbaceous part of the Garden and Acrid Lettuce, and the inspissated juice of Lactuca sativa and virosa, or Lettuce Opium.

Syn. Laitue (*F.*), Lattich (*G.*), Lataw Gewoone, salade (*Dutch*), Laktuk (*Swed. Dan.*), Latik (*Russ.*), Lattuga (*I.*), Lechuge (*S.*), Alface (*Port*), Khasky (*Arab*).

The garden lettuce is cultivated almost generally over Europe; but its native country is unknown. The root is fibrous; and sends up a corymbose stem, which sometimes rises three feet in height. The leaves are roundish, obovate, or spathulate, shining, crisped, rugose, irregularly plaited, and of a yellowish-green colour; but the plant is so well known as to require no description. When it is in flower, the slightest touch on the pedicels occasions the exudation of drops of a white, opaque, milky-looking fluid. The leaves and stem, immediately under the cuticle, contain a secreted juice,

[1] Θριδακίνη Theophrasti. The soporific powers of the lettuce were known to the ancients. Galen employed it: and we are told that Venus, after the death of Adonis, threw herself on a bed of lettuces, to allay the pain of her grief, and repress her desires.

which is pellucid and colourless when in the vessels of the plant, has an agreeable slightly sweetish taste, in the young state of the plant; but it becomes milky when first exposed to the air, and afterwards acquires a brownish colour, resembling that of East Indian opium. This is the *lactucarium*[1] of the Edinburgh and Dublin colleges. The best method of procuring it, as first suggested by Mr. John Young, surgeon in Edinburgh, is to cut off the top of the stem, when it is in flower, about a foot above the ground, and to absorb the milky juice that exudes by means of a moist sponge, from which it can be again compressed into a proper vessel to be inspissated. But, as the cut surface soon ceases to bleed, another slice must be taken under the first; and this may be repeated as long as the fresh-cut surface will yield the juice. The process may be repeated two or three times a day. This juice is also collected upon wove cotton, about half a yard square, as proposed by Dr. Probart; and the impregnated cotton thrown into water, which is afterwards strained and evaporated. The same gentleman prepares an extract, by macerating the stalks and leaves in water, to extract the juice which concretes in the bark of the stems and in the old leaves after the plants have flowered and the leaves begin to turn yellow. But this extract is a much less powerful preparation than the lactucarium. Lactucarium is formed into hard masses, of a wood-brown colour, compact, and somewhat roundish; usually weighing a few ounces.

Qualities.—Lactucarium has, in some degree, the bitter taste and the narcotic odour of opium. Distilled water dissolves the greater portion of it; and the clear solution is of a deep brown colour: Ganzel and others who have examined it obtained no morphia. It contains *extractive*, *resin*, and *mucilage*, and is anodyne; and Dr. John states, that *caoutchouc* also is one of its components. According to Buchner[2], it contains 18·6 per cent. of a *bitter principle*, which has been named *lactucin*; 14·666 of *gummy extractive*; 12·467 of *soft, waxy resin*; 35·100 of *myricin*; and 19·100 of *gluten* or *albumen* = 100·000. Since Buchner's analysis of lactucarium many others have been made, but as yet it is uncertain to what principle the activity of the drug is due. The most recent investigator of the subject is Ludwig; he finds that in 100 parts, 51·37 parts are soluble in water; 48·63 parts insoluble: by acting on the latter portion with boiling alcohol, he obtained

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[1] This name was imposed by Dr. Duncan, sen., who first suggested its use as a narcotic. Vide *Obs. on Pulmonary Consumptions*, by A. Duncan, M. D. *Appen.* p. 162. The French call it *thridace*, from, θρίδαξ, lettuce; but this is the inspissated juice of lettuce, not the lactucarium of the elder Duncan. M. Robinet has proposed to make a syrup of it, by adding to the expressed juice of the plant, just before it flowers, double the weight of sugar. He calculates that ℥j. of this syrup contains six grains of the extract.

[2] *Pharm. Centr. Blatt. fur* 1831. § 467.

a snow-white crystalline substance, lactucerin ($C_{40}\ H_{34}\ O_5$), somewhat resembling a fatty body, but unsaponifiable, and having, in solution, a slight acid reaction.

In the soluble portion, an acid, lactucic, and a third body called lactucin, are contained, which are capable of crystallization, the former with difficulty.

The results of Ludwig's analysis of lactucarium are seen in the following table. In 100 parts,

Lactucerine, or Lactucone - - - - - -	42·64	48·63 per cent. insoluble in water.
Waxy body, readily fusible - - - - - -	3·99	
Vegetable fibre, with a substance which swells in ammonia, and is insoluble in water, alcohol, and ether - - - - - - - -	2·00	
Albumen, of a greyish colour - - - - -	6·98	51·37 per cent. soluble in water.
Extract, soluble in water and spirit - - - -	27·68	
Aqueous extract, insoluble in alcohol of sp. gr. 0·830	14·96	
Lactucerine, held in solution in water by the other substances - - - - - - -	1·75	

(*Chemical Gazette*, vol. v.)

Medical properties and uses. — Lactucarium has been proposed as a substitute for opium by Dr. Cox[1], of Philadelphia; but its value as a narcotic has been more particularly examined by the late Dr. Duncan, senior, who conceived it to be particularly well adapted for allaying the cough in phthisis pulmonalis; and his opinions have been confirmed by the experience of many other respectable practitioners. The hypnotic influence of lettuce was known to Dioscorides, and Galen[2] proved its efficacy in his own person, and eat a lettuce every night to procure sleep. The anodyne influence of lactucarium has been well ascertained: and it undoubtedly sometimes proves useful as a soporific, where from peculiar idiosyncracy, or other causes, opium cannot be taken. The dose is from gr. iij. to gr. vj. in the form of a pill.

2. LACTUCA VIROSA.[3]

Officinal. LACTUCA VIROSA, *Dub.* Strong-scented Lettuce-leaves.

Syn. Laitue vireuse (*F.*), Wilder lattich (*G.*), Stinkende salade (*Dutch*), Stinkende laktuk (*Dan.*), Lattuca Salvatica (*I.*), Alface brava (*Portug.*).

This is an indigenous biennial plant, found growing on the banks of ditches and borders of fields, flowering from July to September. The root is tap-shaped; the stalk rises about three feet in height, is erect, slender, prickly below, smooth above, round, panicled, and not very leafy. The leaves are horizontal, finely toothed, the

[1] I have always found that when I eat lettuce at supper it acts as a soporific.
[2] *De Aliment. Facult.* lib. iii. c. 40.
[3] Θρίδαξ ἀγθία Dioscoridis.

lower ones numerous, obovate, undivided; those of the stem smaller, often lobed, amplexicaule, and beset with prickles on the keel of the under side. The bracts are cordate and pointed. The flowers are numerous, compound, of a sulphur yellow colour, on short pedicels, furnished with small scaly bracts, one at the base of each. The calyx is oblong, and composed of small lanceolate scales; and the corolla consists of florets scarcely longer than the calyx. The seeds are elliptical, compressed, striated, black, and furnished with a stipitate, scabrous pappus.

The leaves and stem contain a white, opaque juice under the cuticle, that abounds more copiously when the plant is in flower; at which time, therefore, they should be gathered, and the juice immediately expressed. The simple inspissated juice obtained in the same manner as lactucarium is, like that of the garden lettuce, wood-brown; but it is in small masses, seldom weighing half an ounce; and having an ash-grey efflorescence on the surface. It is friable.

Qualities. — The odour of the leaves is heavy and fetid, resembling in some degree that of opium; their taste is bitter and acrid: qualities depending on their milky juice. According to Klink, the milky juice contains 7·5 per cent. of *resin*, 8·75 of *wax*, 22·5 of *caoutchouc*, 51·25 of *bitter principle*, *gum*, *lactucic acid*, *lactates of lime* and *magnesia*, and *nitrate of potassa*, and 10 water = 100·00.

Medical properties and uses. — The same as those of lactuca sativa, but more powerful. It yields a larger amouut of lactucarium, and of a more active quality. The Edinburgh and Dublin Colleges refer lactucarium to both species of lettuce. The London College has now taken it from their Materia Medica; they formerly, 1836, referred it to Lactuca sativa only.

Officinal preparations. — Of Latuca Sativa: *Extractum Lactucæ*, L. Of Lactucarium: *Tinctura Lactucarii*, E. *Trochisci Lactucarii*, E.

LAURO-CERASUS. See *Prunus*.

LAURUS. *Spec. Plant. Willd.* ii. 477.

Cl. 9. *Ord.* 1. Enneandria Monogynia. *Nat. ord.* Lauraceæ.

G. 798. *Calyx* none. *Corolla* calycine, six parted. *Nectary* of three two-bristled glands, surrounding the germen. *Filaments* interior, glanduliferous. *Drupe* one-seeded.

Sp. 1. L. *Cinnamomum.* The Cinnamon-tree. *Med. Bot. 3d. edit.* 670. *t.* 223. *Percival's Account of Ceylon*, 4*to.* 346—350. *Hayne*, xii. 20. *Cinnamomum Zeylanicum.* Nees.

Sp. 2. L. *Cassia.* The Cassia-tree. Carua, *Rheede, Hort. Malabar*, i. *p.* 107. *t.* 59. *Herb. Amb.* ii. 65. *t.* 14. *Hayne*, xii. 23.

Sp. 3. L. *Camphora.* The Camphor Laurel. *Med. Bot. 3d. edit.* 681. *t.* 236. Michaux, *North American Sylva*, vol. i. pl. 83. *Hayne*, xii. 27. *Camphora officinarum.* Nees.

Sp. 10. L. *nobilis.* Common Sweet Bay. *Med. Bot. 3d edit.* 678. *t.* 235. *Hayne*, xii. 32.
Sp. 34. L. *Sassafras.* Sassafras Laurel. *Med. Bot. 3d edit. t.* 234. *North American Sylva*, vol. ii. fol. 61. *Hayne*, xii. 19. *Sassafras officinale.* Nees von Esenbeck.

1. LAURUS CINNAMOMUM.[1] CINNAMOMUM ZEYLANICUM.

Officinal. CINNAMOMUM, *Lond. Edin. Dub.* CINNAMOMI OLEUM, *Lond. Edin.* Cinnamon and Oil of Cinnamon.

Syn. Canelle de Ceylon (*F.*), Zmmit: Kanohl (*G.*), Kaneel de Hollande (*Dutch*), Caneel (*Dan.*), Ackta Canel (*Swed.*), Acta Kaneel (*I.*), Canela regina (*S.*), Canella vulgar (*Port.*), Kaneel (*Dan. Russ.*), Kûrûndū (*Cing.*), Dârchinie (*H.*), Dárcasita (*San.*), Karruwa Puttay (*Tam.*), Kayu-manis (*Malay*), Darsini (*Arab.*).

The cinnamon tree is a native of Ceylon[2], growing in great abundance in many parts of the island, particularly near Colombo, where it is cultivated. It also grows plentifully in Malabar, Cochin China, Sumatra, Tonquin, the eastern islands, and the Chinese province of Quangsi. It has been cultivated in the Brazils, Egypt, the isles of Bourbon and the Mauritius, Tobago, and other places. France is partly supplied from Guiana, where it was introduced in 1755. The best cinnamon is the production of Ceylon. The soil in which it thrives is nearly pure quartz sand. That of the cinnamon garden, near Colombo, was found by Dr. J. Davy to consist of 98·5 of siliceous sand, and 1·0 only of vegetable matter, in 100 parts. "The garden is nearly on a level with the lake of Colombo: its situation is sheltered; the climate is remarkably damp: showers are frequent, and the temperature is high and uncommonly equable."[3] Marshall informs us that beyond Negombo and Matura the bark is never good, and that no plant varies more from soil, shade, and culture than the cinnamon. The tree seldom rises above thirty feet in height; has a slender branching trunk covered with a brown ash-coloured cuticle, which is often speckled with dark green, and light orange in the young shoots. From the root spring a number of suckers, which form a bush round the

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[1] Κιννάμωμον Dioscoridis. The Malays call cinnamon kayu-manis, which is sometimes pronounced as if it were written kaina-manis, which Mr. Marshall supposes to have been the original of the ancient Greek name kinnamomon, which, however, Scaliger (*Not. in Garz.*) derives from the Hebrew *kinamon.* Burman has withdrawn the cinnamons from the genus laurus, and constituted them a new genus, Cinnamomum; he named the above species C. *Zeylanicum.* Sprengel names it Persea *Cinnamomum; Syst. Veg.* ii. 263.

[2] Notwithstanding the jealousy of the Dutch, the cinnamon tree, long before the British obtained possession of Ceylon, was cultivated at the Isle of France, in several parts of India, Jamaica, and some other of the West India Islands. Mr. Miller first cultivated it in this country in 1768; and a plant of it has regularly flowered and ripened seed in the hot-house of the Bishop of Winchester, at Farnham, for several years past.

[3] *Davy's Account of the Interior of Ceylon*, 4to. p. 39.

trunk. The leaves, which stand in opposite pairs on short, slightly channelled petioles, are from four to nine inches in length, oblong, pointed, tri- or quinquenerved; when young, scarlet or pale liver-coloured, with yellow veins, but afterwards of a dark green colour on the upper disk, glaucous on the under; and have a spicy odour and a hot taste when rubbed and chewed. The flowers, which appear in January, are white or pale yellow and inodorous, in lax axillary and terminal panicles. The calyx is pubescent, with six deep divisions: the petals are oval, pointed, concave, and spreading, longer than the filaments, which are in ternaries, flattish, erect, and the three innermost glanduliferous at the base; and the anthers are double. The fruit is an oval or ovoid drupe, resembling a small plum, adhering to the receptacle, with the apex depressed, and the pulp fleshy, enclosing a small nut. It has a terebinthine odour, and a taste not unlike that of the fruit of the juniper.

There are several varieties of the cinnamon tree known at Ceylon. Seba enumerates ten: but the four following only are said to be barked: — 1. Honey, sharp, sweet, or royal cinnamon (*rase curundu*, in the language of the natives), which is the finest sort; 2. Snake cinnamon (*nai curundu*), similar to the first; 3. Camphorated cinnamon (*capura curundu*), so named from its having the odour of camphor, and the root yielding camphor by distillation; and, 4. Bitter astringent cinnamon (*cahatte curundu*), which has smaller leaves than the former varieties.[1] The trees that grow in the valleys, in a white sandy soil, are fit to be barked when four or five years old; but those in a wet soil, or in shady places, require to be eight or nine years of age. The bark is good for nothing if the tree be older than eighteen years. The tree was formerly propagated by a species of pigeon, that digested the fruit only, and avoided the seed; but, since the time of Falck, one of the Dutch governors, who, about the middle of the eighteenth century, raised it from fruit sown in his garden, it has been regularly cultivated in what are termed the cinnamon gardens, which are nearly 10,000 acres in extent. Some cinnamon, however, is still procured from wild plants, growing in the jungles.

The barking, particularly in the vicinity of Negombo and Matura, commences early in May during the wet season, and continues until late in October. The *choliahs*, or bark peelers, are under native officers, called cinnamon *moodeliars*[2]; who are answerable

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[1] The other sorts mentioned by Seba are: — Sandy cinnamon, *welle coronde*, which feels gritty when chewed; glutinous cinnamon, *sewel coronde;* insipid and inodorous cinnamon, *nicke coronde;* drum cinnamon, *dawel coronde*, so named because the natives make drums of the wood; prickly cinnamon, *catte coronde;* flowering cinnamon, *mael coronde*, the tree being always in bloom; and three-leaved cinnamon, *toupat coronde*. — *Phil. Trans.* xxxvi. 97—105.

[2] Under the moodeliars are inferior officers named *mohandrums* and *aratchays;* and, in 1811, General Maitland appointed a superior, who is named *mahamoodeliar*.

for the quantity barked. Branches of three years old are selected, and lopped off with a pruning-knife or bill-hook, called a *ketta*. To remove the bark, a longitudinal incision is made through it on both sides of the shoot, so that it can be gradually loosened, and taken off entire; the epidermis, and the green matter between it and the inner bark, are carefully scraped off whilst the bark is stretched over a cylinder of wood; so that the bark speedily dries, contracts, and rolls itself up, forming hollow cylinders. The bark is not, however, immediately scraped, but tied up in bundles, and allowed to remain for twenty-four hours, by which a fermentation is produced that facilitates the separation of the epidermis, which, with the green pulpy matter under it, is then carefully scraped off. The bark having now assumed the quilled form, the smaller pieces are put within the larger.[1] The cinnamon, when dry, is tied up in bundles of 30 lbs. weight, and carried to the government store-house, where the quality is determined by inspection of the bundles. It was formerly chewed, and the surgeons who used to be thus employed had their mouths so excoriated as to be unable to continue the process longer than two days together; but tasting is now seldom had recourse to. It is examined, however, very carefully, and divided into a first, a second, and a third sort. The last is rejected, and the two former only should be sent to Europe. The bark of large branches and that of very small are rejected: the first has a reddish brown hue, a rough surface, tastes disagreeably pungent, and feels gritty in the mouth: the second is of a light straw colour, is thin, has little aroma and as little taste. Both kinds are occasionally found in the market. The coarse kind in particular is sold under the name of cassia; although the greater part of the cassia of the shops comes from Canton.

Ceylon cinnamon is brought home in bags or bales, weighing 92 lbs. each[2]: and, in stowing it, black pepper is mixed with the bales to preserve the cinnamon. According to Mr. Marshall's account, the annual quantity of cinnamon sold at the East India Company's sales, taken on an average of eight years, up to 1810, is 318,258 lbs., at an average price of six shillings per pound.[3] An inferior description of cinnamon is imported from Malabar; and much cinnamon of a still inferior kind reaches Europe through private merchants, particularly from China, but the Canton cinnamon is sold under the name of cassia.

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[1] Prior to the 15th century, all the cinnamon used in Europe was imported by the Arabs, and passed through the hands of the Venetians; after this the Portuguese became the sole importers, and continued to be so until 1645, when their trade was divided with the Dutch, who obtained entire possession of it in 1658, and were the principal cinnamon merchants until 1796, when Ceylon fell into the power of the British.

[2] The bags are made of cloth of the cocoa-nut bark.

[3] *Annals of Phil.* vol. x. p. 358.

The *oil of cinnamon* is prepared by macerating the bark[1], coarsely powdered, in sea water for two days, then distilling with a slow fire, and separating the oil from the water with which it comes over. A light oil comes over, which swims on the water; and a heavy oil, which gradually sinks in it: the light oil soon separates from the water; but the heavy falls down very slowly, requiring ten or more days for its complete separation. The average quantity of oil procured from 10 lb. of the cinnamon is one ounce. Both the light and the heavy is equally prized; and they bring the same price in the Colombo bazaars. Oil of cinnamon is adulterated with oil of cassia, or with alcohol, or expressed oil. The distilled water is kept for repeated distillations. Cinnamon which has been kept yields two ounces of light oil for every five of heavy oil.

Good cinnamon is sometimes intermixed with cinnamon from which the oil has been drawn, and with cassia. The former is detected by the weakness of its odour and taste; and the latter by its thickness, smooth fracture, and remarkably slimy taste.

Cinnamon from China is imported under the name of cassia. It is usually in single quills, which are thicker, rougher, denser, and break with a shorter fracture than the fine Ceylon cinnamon. It is thus readily distinguished, but the distinction is rendered more evident when it is made into infusion. The infusion of real good cinnamon affords no blue tint on the addition of tincture of iodine; that of cassia becomes blue, owing to the cellular part, which contains fecula, being left on the bark.

Qualities. — Cinnamon has a very pleasant fragrant odour, and a pungent, aromatic, sweetish taste; and the pieces, when chewed, soften in the mouth. When it is very hot, without sweetness, and leaves a mawkish taste in the mouth, it is of an inferior quality. The best is rather pliable, but breaks in splinters; is as thin as paper, and of a light yellowish-fawn colour; *thickness* and a *dark* or *brown colour* are marks of inferiority. What is called Chinese cinnamon, or *cassia,* is lighter coloured, rougher, denser, and breaks shorter. The taste is harsher, more pungent and ligneous, without the sweetness of the Ceylon cinnamon. The age of the tree from which the bark is taken influences much the character of the cinnamon: it should be five years old in dry places, and nine in moist and shady situations. The trees on elevated sandy localities, exposed to the direct rays of the sun, have the sweetest odour, and furnish the most valuable bark. These qualities depend on the *volatile oil,* which may be separated by macerating the bark in

[1] The bark of the roots yields an aromatic volatile oil, denominated oil of camphor, which is used in Ceylon as a rubefacient in painful affections of the joints, and in sprains. Oil of cinnamon has always been dear. Alston says that he saw the finest Oriental sold in Holland, in 1721, at 50 stivers the drachm, "or the common price of the pound of cinnamon at Amsterdam." — *Lect. on Mat. Med.* vol. ii. p. 7.

alcohol, and distilling the tincture; in which process the oil does not rise with the spirit, but remains in the retort. From ℥ xvj. of the bark, Neumann obtained, by this means, only two scruples and a half of oil.[1] This *oil* has a pale gold colour, is heavier than water, perfectly soluble in alcohol, and has the odour and taste of the cinnamon concentrated. It is violently acted upon both by nitric and sulphuric acid. The longer the bark is kept the less volatile oil it yields, the oil being gradually oxidized and partly converted into resin and cinnamic acid. For properties and composition of this oil, see *Cinnamomi Oleum*, Part III.

Medical properties and uses. — Cinnamon *bark* is astringent, cordial, and tonic. It has been supposed to possess also antiperiodic properties; but this opinion requires support. Hence it is found to be efficacious in diarrhœa proceeding from a weakened and languid state of the intestines, atonic dyspepsia, and chronic nervous debility: and when given in the form of watery infusion, it removes nausea, and checks vomiting. But the principal use of cinnamon is to cover the disagreeable taste of other remedies. The *oil* is a powerful stimulant and stomachic; and is used as such in cramps of the stomach, flatulent colic, hiccough, and nervous languors. It is sometimes inserted into the hollow of a decayed tooth to allay the pain of toothach.

The dose of the bark in powder is from grs. x. to ℈ j.: that of the oil from ♏ j. to ♏ iij. on a lump of sugar, or rubbed down with sugar as an oleo-saccharum; or with yolk of egg and syrup, so as to form a mixture with water.

Officinal preparations. — *Aqua Cinnamomi*, L. E. D. *Essentia Cinnamomi*, D. *Oleum Cinnamomi*, D. *Spiritus Cinnamomi*, L. E. *Tinctura Cinnamomi*, L. E. *Tinctura Cinnamomi comp.* L. E. D. *Pulvis Cinnamomi compositus*, L. It is contained in many other officinal preparations.

2. LAURUS CASSIA.[2]

Officinal. CASSIÆ CORTEX, *Edin.* CASSIÆ OLEUM, *Edin.* The bark of the Cassia-tree.

Syn. Of the bark: — Casse (*F.*), Chinesischer Zimmt (*G.*), Cannellina; Casilignea (*I.*), Cassialignea (*S.*), Louranga puttay (*Tam.*), Kayu manis (*Jav.*), Kayu legi (*Malay*), Sing Rowla (*Nepaul*), Seleckheh (*Arab.*), Tej (*H.*), Twacha (*San.*). *Of the buds:* — Fleur de la Canelle (*F.*), Cassia Bloemen (*D.*), Tejpatka konpul (*H.*), Sirnāgāpoo (*Tam.*).

The above tree, designated as yielding cassia, is supposed by some botanists to be a variety (*cassia*) of Cinnamomum *Zeylanicum;*

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[1] *Neumann's Chymistry*, ii. 188.

[2] Κασσία Dioscoridis. It is the Dawul Kurundu of the Cingalese, the Cannella Matto of the Portuguese, and the Wilde Canule of the Dutch. — *Marshall, Phil. Trans.* 1817.

but the tree which yields the Chinese or Singapore cinnamon, which is known under the name of *Cassia*, in Europe, is not the bark of the Cinnamomum *Zeylanicum*[1], although Mr. Marshall maintains that it is the bark of the larger shoots of the Ceylon cinnamon, and Dr. Wight states, that the bark of the older branches of the true cinnamon tree is exported from Malabar under the name of cassia. I am inclined to accord with Dr. Christison[2], in the opinion of Nees von Esenbeck, that cassia is the bark of the Cinnamomum *aromaticum*, which is a native of China. The branches are angular, and the petioles downy. The leaves are oblong, acute at each end; triple-nerved: the nerves are downy and vanishing towards the apex of the leaf. The panicles are narrow and silky.

The Chinese cinnamon, although sent to us from Singapore, is procured in the Cassia forests, in the province of Kwang-se, in China. The larger branches are said to be the parts of the tree barked; and the cuticle only appears to be scraped off, the cellular integument being left, which, as the bark is taken from large branches, is thick, spongy, and full of a slimy mucus. This plant is never decorticated at Ceylon; but the cinnamon under the name of *cassia*, sent from Ceylon, is the bark of the thick branches of L. *cinnamomum*, and is merely a coarse cinnamon. Some cassia is furnished by Sumatra, but the tree yielding it is unknown. According to Mr. Marshall[3], the *Cassia-bud* of commerce is the hexagonal fleshy receptacle, or cupuliform calyx, of the seed of the L. *cinnamomum*, and not the L. *cassia*. But as they are not prepared at Ceylon, but come chiefly through Singapore, Calcutta, and Madras, and are the produce of China, it is probable that they are the calyces of C. *aromaticum*.[4]

Cassia is imported in chests, half-chests, and occasionally in quarter chests.

Qualities. — The odour of the bark termed Cassia-bark is similar to that of cinnamon, but fainter and the taste is more pungent, but less agreeable: appearing slimy when much chewed. It is of a cinnamon colour, in pieces more or less quilled, but the quills are not inserted in one another: they are nearly one tenth of an inch in thickness; break with a short, close fracture, and show it to consist of two parts; the inner darker and of a fine texture, and the outer paler and somewhat spongy. When these are separated, the inner part has all the sensible qualities of real cinnamon, only more pungency, whilst the outer has scarcely either flavour or taste: and I am of opinion, that the allowing this cellular

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[1] *Systema Laurinarum*, 52. [2] *Dispensatory*, art. *Cassia.*

[3] *Annals of Phil.* vol. x. p. 245.

[4] Martius affirms that they are the calyces of C. *aromaticum.* — *Pharmacognosie*, § 213.

integument, from which the cinnamon is freed, to remain in the bark termed cassia, constitutes the chief difference between these two barks.[1] Cassia is easily distinguished from cinnamon by its infusion, when cold, striking a blue colour, with tincture of iodine. According to Bucholz, it consists of 0·8 of *volatile oil,* 4·0 *resin,* 14·6 *gummy extractive* (fecula?) 64 *lignin* with *bassorin,* and 16·3 *water* = 100·0.[2] *Cassia buds* are not officinal. They have the same odour and taste as the cinnamon bark; are of a brown colour, and resemble a nail, with a round head, which gradually terminates in a point. Both the bark and the buds yield, in distillation with water, volatile oil, similar to that of cinnamon, on which their qualities depend. The greater part of the oil is imported from Singapore. It has a pale golden-yellow colour, which does not deepen by keeping. Its sp. gr. is 1095; hence it sinks in water. It is scarcely soluble in water, and not very soluble in alcohol: weak nitric acid converts it into benzoic acid, and the odour of oil of bitter almonds is developed. The strong acid converts it into crystals of cinnamic acid. Its formula is $C_{36}\ H_{16}\ O_2$.[3]

Medical properties and uses.—Cassia bark, buds, and oil, are stimulant cordials; and are used in the same cases, and in the same manner, as cinnamon bark.

Officinal preparations. —*Aqua Cassiæ,* E. *Tinctura Cassiæ,* E. *Spiritus Cassiæ,* E.

3. LAURUS CAMPHORA, or CAMPHORA OFFICINARUM.

Officinal. CAMPHORA, *Lond. Edin. Dub.* Camphor. A concretion prepared from the wood of Camphora officinarum.

Syn. Camphre (*F.*), Kampfher (*G.*), Kamfer (*Dutch*), Kamfert (*Swed.*), Campher (*Dan.*), Kamphor (*Russ.*), Canfora (*J.*), Alcanfor (*S. Port.*), Cafoor (*Arab.*), Kaafur, or Capoor Barroos (*Malay*), Kupoor (*H.*), Curfura (*San.*), Carpoorum (*Tam.*), Kaphoor (*Pers.*), Tchang (*Chinese*).

The species of laurel here designated, Camphora *officinarum,* is a native of China and Japan. It yields the camphor of commerce, but a kind of camphor comes from Sumatra, which is the production of the Dryobalanops *Camphora,* a tree belonging to a different order altogether from the laurel, the order *Dipteraceæ.* The camphor laurel[4] rises to a considerable height, is much branched, and covered with a smooth greenish bark. The leaves, which stand on long foot-stalks, are acuminate at both extremities, entire,

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[1] It is said that the rejected or third sort of cinnamon prepared in Ceylon is imported into England, and sold as cassia?

[2] *Gmelin, Hanb. d. Chim.*

[3] *Dumas and Peligot.*

[4] *Nees Von Esenbeck, Syst. Laurin.* 88.

coriaceous, ribbed, of a bright shining green on the upper surface, paler beneath, with a sunk gland in the axils of the principal veins. The flowers are small, white, pedicellated, in terminal and axillary corymbose panicles. The calyx is six-cleft, papery, with a deciduous limb; the filaments are shorter than the corolla, and support 4-celled anthers glandular at the base, three sterile; the germen is roundish, placed on the obconical base of the calyx. The fruit, which resembles that of the cinnamon, is a red, oval berry, seated in a small yellow cup, supported in pairs on a long peduncle.[1]

The roots, wood, and leaves of this tree have a very strong odour of camphor; and, from the roots and smaller branches, it is obtained by sublimation. They are cut into chips, which are suspended in a net, within a kind of still or iron pot, the bottom of which is covered with water, and an earthen head fitted to it: heat is then applied, and the steam of the boiling water, penetrating the contents of the net, elevates the camphor into the capital or head, where it concretes on rice-straws, with which this part of the apparatus is lined.[2] These granules are next melted in a basin, and then cut into layers, which are placed alternately with earth, in a copper vessel, over which another is inverted and luted. The vessel is then placed on the fire, and the camphor sublimes and crystallizes. But, as we have already stated, much of the camphor, which is not brought to Europe, is obtained in Sumatra, where the trees which yield it are cut and split, and the camphor, which is found concreted in the heart of them, is picked out, and washed in a ley of soap. Camphor is imported into this country in chests, drums, and casks: it is in small, granular, friable masses, of a dirty white or greyish colour, very much resembling in appearance half-refined sugar. Sometimes it is brought in square loaves. It often contains earth and other impurities.[3]

Camphor was introduced into Europe by the Arabians. Formerly all the crude camphor brought to Europe was purified by the Venetians, and afterwards by the Dutch, who kept the art

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[1] Specimens of it are common in our hothouses; but they rarely flower.

[2] According to Kæmpfer, the process is carried on chiefly by the peasants of Satzuma. — *Amœn.* 779.

[3] Zea describes a variety of camphor which is procured in South America, from a tree, the botanical characters of which are not yet known; but which is termed *carratte* by the natives. The camphor exudes from the bark in the form of tears. Camphor is not the production of those plants merely from which that known in commerce is obtained, but has also been procured from the roots of the cinnamon, cassia, and sassafras laurels; from those of galangale, zedoary, ginger; and from cardamom seeds and long pepper. The volatile oils of lavender, sage, thyme, peppermint, rosemary, and several other labiated plants, yield it; and an artificial camphor is prepared by passing hydrochloric acid gas through oil of turpentine. The varieties of camphor thus obtained, however, differ in some respects from common camphor. The Shorea *robusta* of Roxburgh, *Car. Pl.* vol. iii. p. 212., is said to yield a very fine species of camphor.

secret and long monopolised the business; but it is now practised to a considerable extent in this country. It is sublimed in glass vessels called bomboloes, after being mixed with one-twentieth[1] of its weight of quicklime; and is afterwards fused, either "by increasing the heat suddenly when the sublimation is almost ended, without transferring the camphor to different vessels, or by melting the sublimed flowers in a vessel for that purpose."[2] Thus refined, it is in large round cakes, or basins, about two or three inches thick, concave on the one side, convex on the other, and generally perforated in the middle.

Qualities. — Pure camphor has a strong, peculiar fragrant, penetrating odour; and a bitter, pungent, aromatic taste. It is white, semi-transparent, unctuous to the touch, and friable, breaking with a shining, foliated, or tabular fracture, which displays a crystalline texture; and although brittle, yet it is also, in some degree, ductile, and therefore is not easily pulverized. It swims on water, its specific gravity being 0·988; and it is so volatile, that if it be not kept in well-stopped vessels, it loses a very considerable proportion of its bulk and weight by evaporation, particularly in a moist atmosphere. It melts at a temperature of 288°, boils at 400°, and sublimes in close vessels, crystallizing unchanged in hexagonal plates.[3] It is readily ignited, and burns with a brilliant white flame, giving out much smoke. When triturated with water, very little is dissolved[4], although it communicates to the water its odour and pungency; but the addition of carbonic acid gas augments very much the solvent power of water over camphor. Alcohol, ether, the fixed and volatile oils, the sulphuric and nitric acids diluted, the hydrochloric, the strong acetic, and the fluoric acids, dissolve camphor, which is again separated unaltered from these solutions by the addition of much water. Concentrated sulphuric acid decomposes it, forming artificial tannic acid; and by repeatedly distilling it with nitric acid, it is converted into *camphoric acid* ($C_{10}\ H_7\ O_3 + HO.$) Alkalies exert scarcely any action on it. Camphor unites with, and converts into a soft tenacious mass, the hardest resinous substances. According to Dumas, it is an oxide of *camphogen* ($C_{10}\ H_8$): hence its formula is $C_{10}\ H_8\ O$. I have formed camphor by passing a stream of oxygen gas through highly rectified oil of turpentine.[5]

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[1] The French process is one sixtieth.

[2] *Aikin's Dictionary of Chymistry*, art. *Camphor*. Professor Robinson, who saw the process as it was conducted in Holland, says, that the camphor is in a liquid state in the subliming vessel. — *Black's Lectures*, ii. 351.

[3] Mr. W. Phillips says, that the native crystal of camphor is a flat octahedron. — *Paris's Pharmacologia*, 5th edit. vol ii. p. 117.

[4] Cadet asserts that one French pint of water dissolves about sixteen grains of camphor, which are again precipitated by pure potassa. — *Ann. de Chimie*, lxii. 132.

[5] A stream of perfectly dry hydrochloric acid gas transmitted through recently distilled oil of turpentine, gradually converts it into a crystalline substance closely resembling camphor, called artificial camphor. Formula $C_{20}\ H_{16}\ H\ Cl$.

Dryobalanops, or Borneo camphor, occurs in white, opaque, tubular crystals, having, besides the odour and taste of camphor, a somewhat garlic flavour; it is heavier than water, having a sp. gr. 1009. It can be powdered without alcohol. It sublimes at 212°; but it does not fuse under 380°, and boils at 440°. Its formula, according to Pelouze, is $C_{20}\ H_{18}\ O_2$. Nitric acid converts it into common camphor.

Medical properties and uses. — Camphor is stimulant and narcotic in large doses, but its stimulant powers are very transitory, and in moderate doses it is diaphoretic, antispasmodic, and anodyne, while its primary action is followed by sedative effects. It acts chiefly on the nervous system: and transudes through the skin, and is exhaled by the lungs. The Arabians appear to have first used camphor as a medicine[1], and by them it was regarded as refrigerant; an opinion which, even in more recent times, has been the subject of much controversy. In moderate doses it operates as a cordial, increasing the heat of the body, and exhilarating; besides softening, and rendering the pulse fuller, and promoting diaphoresis: in larger doses, it allays irritation and spasm, abates pain, and induces sleep; but in immoderate doses camphor produces vomiting, vertigo, delirium, convulsions, and other deleterious effects.

As a stimulant, camphor is beneficially used in all fevers of the typhoid kind[2], cynanche maligna, malignant measles, confluent small-pox, and as an adjunct to bark and opium to check the progress of gangrene; and in spasmodic affections, as hysteria, epilepsy, chorea[3], asthma, and painful menstruation. Its narcotic and anodyne effects being produced with very little increase of pulse, it has been successfully employed for allaying pain and irritation even in some inflammatory diseases; as pneumonia, acute rheumatism, gonorrhœa, small-pox when attended with convulsions, gout, and in the delirium of mania, and inflammatory fevers. But in these cases its use should be preceded by evacutions; and the remedy itself combined with nitre, or antimonials: and in maniacal cases with opium.[4] Camphor is also given internally, to obviate the irritating effects of some other medicines, and to increase the activity of others; it lessens the irritating quality of mezereon, cantharides, the saline preparations of mercury, and drastic purgatives; it corrects the nauseating property and prevents the irritation which squill is apt to produce on the coats of the bladder; and combined with senna it greatly aids its purgative power.

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[1] They call it *Canfur* as well as *Caofoor.* — *Clusios Exot. 245.*, quoted by *Alston.*

[2] Etmuller says, "remedium in febribus malignis sine Camphora est instar militis sine gladio."

[3] *Med. Trans. of Coll. of Phys. Lond.* vol. v. p. 366.

[4] In some experiments upon dogs with camphor, M. Defermon found that contraction of the spleen takes place, producing a rugose appearance of its surface, and a movement throughout the whole viscus.

Camphor may be administered in the solid form; but as in this state it is apt to occasion nausea, it is generally ordered in a state of minute division, suspended in fluids by means of mucilage or the yolk of eggs; sometimes by magnesia, which, assisting its division, and rendering it smooth as starch, admits of its combination with acids; and as several of the gum-resins, when triturated with it, form a soft uniform soluble mass, they also may be employed for diffusing it in water.[1] It may be advantageously united with ammonia, aromatics, opium, bark, and tonics, in low fevers, and diseases of debility; with calomel, antimonials, digitalis, and neutral salts, in inflammatory diseases; with the fetid gums and other narcotics, in spasms and convulsive affections; and with squill and ipecacuanha, in pulmonary complaints.

As a local anodyne, camphor is used in frictions, dissolved in oils, alcohol, or acetic acid, for allaying rheumatic and muscular pains; and, with the addition of laudanum, we have found it of great efficacy when rubbed on the abdomen, in flatulent colic, dysentery, and inflammations of the viscera. In collyria it is useful in opthalmia; and dissolved in oil, as an injection, in ardor urinæ, and as an enema in the tenesmus occasioned by ascarides, or other irritations of the rectum.[2] A pill of camphor and opium, or a solution of camphor in oil of turpentine, put into the hollow of a carious tooth, affords almost immediate relief in toothach. Twenty or thirty grains of camphor, added to a common poultice and applied to the perineum, allays chordee in gonorrhœa.

The dose of camphor is from grs. ij. to ℈j., repeated at shorter or longer intervals according to the extent of the dose and the nature of the case. It may be rubbed up with mucilage and almond emulsion, so as to suspend it in water; or it may be readily suspended in milk: and these forms are preferable to that of pills or bolus. The bad effects of an overdose are most effectually obviated by opium.

Officinal preparations.—*Mistura Camphoræ*, L. E. D. *Mistura Camphoræ cum Magnesiâ*, E. *Spiritus Camphoræ*, L. D. *Tinctura Camphoræ*, E. D. *Tinctura Camphoræ composita*, L. *Tinctura Opii camphorata*, E. D. *Acidum aceticum camphoratum*, E. D. *Linimentum Camphoræ*, L. E. D. *Linimentum Camphoræ comp.* L. D. It is contained also in other officinal preparations.

4. LAURUS NOBILIS.[3]

Officinal. LAURUS, *Lond.* Laurel berries, or fruit of Laurus nobilis.

Syn. Baies de Laurier (*F.*), Lorbeerbaum; Lorbeeren (*G.*), Laurier-boom

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[1] *Murray's Syst. of Mat. Med. and Pharm.* ii. 57.

[2] In some constitutions it must be exhibited in this form with caution: "two scruples of it given to woman in a glyster proved so irritating as to bring on pains resembling those of labour." — *Heberden, Med. Trans.* vol. i. p. 473.

[3] Δαφνη Dioscoridis.

(*Dutch*), Lagerbäostreed (*Swed.*), Laurbertree) (*Dan.*), Laurovoe derevo (*Russ.*), Bobek drzewo (*Pol.*), Alloro; Bacchi di Lauro Riccio (*I.*), Laurel; Bayas (*S.*). Loiro (*Port.*).

This tree is a native of Italy and the south of Europe; but is cultivated in this country, and is not uncommon in our gardens, flowering in April and May. It is a handsome evergreen; and although it appears as a shrub in England, yet in its native soil and climate it rises twenty or thirty feet in height. The bark is smooth, and of a green olive colour. The leaves are oblong, lanceolate, about three inches long, alternate, on short petioles, smooth, entire, veined, often waved at the margin, of a firm texture, and a deep green colour, in 4 to 6 flowered globose umbels, in short axillary clusters; with a small bearded pore at the axils of the lower vein on the under side. The flowers are of a yellowish white colour, glandular dotted. The corolla is divided into four oval segments. The berry is superior, of an oval shape, fleshy, and of a dark purple, almost black colour.

Laurel berries, and the oil which is obtained by boiling the berries in water, are imported from the Straits. The simple expressed oil is insipid.

Qualities.—Both the *leaves* and the *berries* have a sweet, fragrant odour; and the former have a bitter, aromatic, astringent taste. Both contain an *oil*, which is of a yellowish green colour, has a stronger but similar odour and taste. According to Bonastre, the constituents of the berries are, 0·8 *volatile oil*, 12·8 *fixed oil*, 1·0 of a *camphor-like matter*, which has been named *laurin*, 7·1 *wax*, 1·6 *resin*, 0·4 *uncrystallizable sugar*, 17·2 *gummy extractive*, 6·4 *bassorin*, 25·9 *starch*, 18·8 *woody matter*, 0·1 *soluble acidulated albumen*, 6·4 *water*, and 1·5 *salts* = 100·00. The volatile oil is pale yellow, soluble in alcohol and ether; and consisting of a lighter and a heavier oil. The *laurin* closely resembles camphor.

Medical properties and uses.—Bay leaves, berries, and oil, are narcotic and carminative. They were formerly given in coughs, flatulent colic, hysteria, and obstructed menstruation; but their internal use is now abandoned; and, as an external application, they are generally compounded with other stimulants. The oil is used as a local excitant, applied as an embrocation.

The berries are contained in *Confectio Rutæ*, L.

5. LAURUS SASSAFRAS. SASSAFRAS OFFICINALE.

Officinal. SASSAFRAS, *Lond. Edin. Dub.* The root of Sassafras officinale.

Syn. Sassafras (*F.*), Sassafras (*G.*), Sassofrasso (*I.*).

This species of sassafras is a native of the southern parts of North America, and Cochin China. It is cultivated in Jamaica; and withstands the cold of our climate so as to be frequently

reared in gardens as an ornamental shrub. The flowers appear in May and June. In America the plant rises twenty, thirty, and even fifty feet in height, with the trunk about twelve inches in diameter, covered with a rough, furrowed, grey bark, and brownish towards the top. The leaves are of different shapes and sizes; some being oval, entire, and about four inches long and three broad; and others, the most numerous, lobed, about six inches long, and nearly as broad: they are of a lucid green colour, downy on the under surface, petiolate, and alternate. The flowers, which appear in spring, immediately under the leaves, before they begin to be evolved, are small, and produced in pendant panicles; and at the base of the pedicels are linear bracts. The corolla is divided into six narrow, convex, yellowish or greenish-white segments, enclosing the male flowers, which contain nine stamens supporting yellow anthers. The hermaphrodite flowers, which are on a separate plant, have six stamens only, and a simple style. The berry, which is oval, and, when ripe, of a deep blue colour, is contained in a small red clavate cup, supported on peduncles from one to two inches in length.

The sassafras plant was discovered by the Spaniards, immediately after their conquest of Florida, in 1538, under Ferdinand de Soto, and termed by them cinnamon wood, on account of its odour.[1] The root is the part used: it is imported in what are termed logs; which are straight and branched pieces, light, of a spongy texture, and covered with the thick, rough bark. The bark is separated, and the woody part is then cut into chips, as is also the root.

Qualities.— Sassafras root and bark have a fragrant odour, and a sweetish aromatic taste. The wood of the root is of a brownish-white colour; and the bark ferruginous within, spongy, and divisible into layers. Their sensible qualities and virtues depend on a volatile oil, which can be obtained separate by distilling the chips or the bark with water. It is very fragrant, hot, and penetrating to the taste, of a pale yellow colour, and heavier than water. Water extracts the virtues of sassafras partially: alcohol, completely; and, when the tincture is evaporated, it leaves an extract which contains the whole virtue of the plant.

Medical properties and uses.— Sassafras is a stimulating diaphoretic and diuretic. It has been employed in cases of chronic rheumatism, gout, and in cutaneous affections. It was once regarded as serviceable in lues venerea, but it has no pretension whatever to the character of an antisyphilitic. Its effects are very uncertain; and even the diaphoresis which it is supposed to occasion, when used in the *diet-drink*, may rather be ascribed to the guaiacum, and other more powerful medicines, with which it is combined in

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[1] *Savary's Dictionary*, ii. l. 487.

that preparation. An infusion of the chips, taken as tea, is a common domestic remedy in the above-named complaints; but I know instances in which it has been taken regularly every morning for a couple of years without any perceptible benefit. The infusion, however, is the best form of giving the remedy: too much of the oil is dissipated in making the decoction.[1] The oil is sometimes given with the same intentions as the infusion.[2]

Officinal preparations. — *Oleum Sassafras,* E. It is contained in *Decoctum Sarzæ compositum,* L. E. D.

LAVANDULA. *Spec. Plant. Willd.* iii. 60.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.
G. 1099. *Calyx* ovate, somewhat toothed, supported by a bract. *Corolla* resupine. *Stamens* within the tube.
Species 1. L. *Spica.* Lavender. *Med. Bot.* 3*d edit.* 221. *t.* 114.
Officinal. LAVANDULA[3], *Edin. Dub.* The flowers of Lavender.

Syn. Lavande (*F.*), Lavendelblumen (*G. Dutch, Dan. Swed.*), Lawanda (*Pol.*), Lavandola (*I.*), Alhuzema; Espliego (*S.*), Alpazema (*Port.*), Lavanda Kolosistaia (*Russ.*).

The plant named by the Pharmacopœia is not that which is officinally employed. It is the L. *vera,* the narrow-leaved species, which is cultivated, and used in this country. The L. *spica* is unknown, except in particular collections, in Great Britain. The L. *vera* is a perennial, a native of the south of Europe, but is cultivated in great abundance at Mitcham, in Surrey, and generally in our gardens[4], flowering from June to September. It is a much branched shrub, rising in its proper soil often four feet in height; the woody part of the stem being covered with a rough brown bark, while that of the shoots, which are quadrangular, is of a pale glaucous colour. The leaves of the most common variety are glaucous, narrow, nearly linear, and entire: the lower petiolate, and the upper ones sessile. The flowers are produced on the young shoots in terminal spikes, which consist of interrupted whorls. The corolla is greyish-blue, tubular, and labiate; the upper lip large and bifid: the lower divided into three segments. The filaments are within the tube, and support small simple anthers: the style, which is slender, is crowned with a bilobated stigma.

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[1] Dr. Paris (*Pharmacologia*) has given the following formula, as that by which much of the nostrum called Godfrey's Cordial is prepared: — "Infuse ℥ix. of sassafras, and of the seeds of coriander, carraway, and anise, of each ℥j; in six pints of water: simmer the mixture until it is reduced to four pints; then add lbs. vj. of treacle, and boil the whole for a few minutes: when it is cold, add f℥iij. of tincture of opium."

[2] In Virginia a beer is made by boiling the young shoots of the sassafras in water, adding molasses to the decoction, and fermenting it. Soon after its introduction into Europe, M. Bremane (*Sassafralogia*, 1627) informs us, it was sold for 50 livres per lb.

[3] Iφνον Theophrasti.

[4] It was cultivated in England so early as 1568, according to Turner.

The flowers are cut in dry weather, when they begin to blow.

Qualities.—Lavender flowers have an agreeable, fragrant odour, and a warm, bitterish taste. Alcohol extracts their virtues completely, and elevates in distillation all their odorous parts: water acts less completely. The *oil*, however, on which their virtues depend, is obtained separate in distillation with water; in the proportion, according to Lewis[1], of one ounce of oil from sixty ounces of flowers. It is of a pale yellow colour, and has the odour of the flowers in an eminent degree.

Medical properties and uses.—Lavender is stimulant and tonic. The oil extracted by alcohol enters into several compositions. The dried leaves in powder were used formerly as a sternutatory; but they are now neglected.

Officinal preparations.—*Oleum Lavandulæ*, E. D. *Spiritus Lavandulæ*, E. *Tinctura Lavandulæ composita*, L. D. *Spiritus Lavandulæ comp.* E.

LAVANDULÆ OLEUM, *L.* See Part III.

LEONTODON. *Spec. Plant. Willd.* iii. 1544.

Cl. 19. *Ord.* 1. Syngenesia Æqualis. *Nat. ord.* Chicoraceæ.
G. 1407. *Receptacle* naked. *Calyx* double. *Pappus* stipitate, hairy.
Species 1. L. *Taraxacum.*[2] *Taraxacum Dens-leonis.* Dandelion. *Med. Bot. 3d edit.* 39. *t.* 16. *Smith, Flora Brit.* 822. *Eng. Bot.* 510. *Hayne*, ii. 4.
Officinal. TARAXACUM, *Lond. Edin. Dub.* RADIX. The root of common Dandelion. Recent root, *L.*

Syn. Dent de Lion, Pissenlit (*F.*), Lowenzahn wurzel (*G.*), Paapenkriud; Pardebloem (*Dutch*), Lövetand (*Dan.*), Lejentand; Markrosor (*Swed.*), Papawa ziele (*Pol.*), Oduvantschik; Du kie taikorie (*Russ.*), Tarassaco (*I.*), Diente de leon; Cardillos tagarnina (*S.*), Dente de Leão (*Port.*).

This is one of our most common indigenous plants, flowering from April to September. The root is large, fusiform, and externally of a dark colour. The leaves are all radical, i. e. they rise from a compressed stem: they are in general runcinate, but in very moist situations nearly entire[3], toothed, smooth, and of a pleasant green colour. The flower-stem is an erect, one-flowered, simple scape, naked, smooth, fistulous, fragile, and abounding with a milky, bitter juice. The flower is terminal, large, of a golden-yellow colour, and closes in the evening: the calycinal bracts are smooth, with the exterior loosely turned down: the florets are very numerous, ligulate, toothed at the extremities, and of a golden-yellow colour. The receptacle is spheroidal and punctured. The

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[1] *Mat. Med.* 371. [2] Αφακη Græcorum.
[3] It must be distinguished from *Leontodon palustre*, Marsh Dandelion.

fruit is obovate, furrowed, of a pale olive colour, and furnished with a radiated pappus, on a long stipe.

The herbaceous part of this plant is blanched, and used on the Continent as a salad; but, in this country, it is very seldom used, the root possessing much more of the principle on which the medicinal powers of the plant depend. The recent, full-grown root only should be used: and it should be dug up between November and February. It is internally white, and covered with a brown cuticle. It yields from 20 to 25 per cent. of extract when taken up in winter, and only 12·5 when raised in the spring.

Qualities. — Dandelion is inodorous, but has a bitter, somewhat sweetish, acidulous taste. The milky juice reddens the vegetable blues, owing, according to Hermbstadt[1], to the presence of tartaric acid. Water extracts the juice better than alcohol; and scarcely any thing is taken up by ether; yet Dr. John detected caoutchouc in it. The decoction is precipitated by infusion of galls and solutions of nitrate of silver, bichloride of mercury, and acetates of lead. Sulphate of iron strikes with it a pale-olive colour; and, after some time, throws down a precipitate. Hence it is probable, that the chief principles of taraxacum are *extractive, gluten,* a *bitter principle* which does not appear to be resinous, and either free *tartaric acid,* or a *bitartrate.* John says it contains, also, *phosphates, sulphates,* and *hydrochlorate* of *potassa,* and *chloride* of *calcium.*[2] Mr. Squire's analysis[3] gives *gum, albumen, gluten,* an *odorous principle, extractive,* and a *crystallizable bitter matter.* The above-mentioned re-agents are incompatible with the decoction. A crystallizable bitter principle named *Taraxicine* has been discovered in the root by M. Polex. Mannite is also found in it.

Medical properties and uses. — Dandelion is excitant, aperient and diuretic. It has been long used on the Continent as a remedy in jaundice, dropsy, hepatic obstructions, and some cutaneous diseases.[4] In this country it has been lately much prescribed; and, although its powers appear to have been over-rated by the German physicians, yet it certainly possesses some efficacy in these diseases; and Dr. Pemberton affirms that he has seen great advantage result from using the extract in chronic inflammation and incipient scirrhus of the liver, and in chronic derangements of the stomach.[5] No medicine has proved so beneficial in my hands in defective secretions of the liver; and my experience accords with that of Dr. W. Philip, who considers it well adapted for cases in which bile is deficient without an impaired state of stomach. Much depends on the nature of the preparation. It may be given in the form of extract or of decoction.

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1 *Thomson's Chymistry,* 4th edit. v. 641.

2 *Gmelin Handb. d. Chim.* ii. 1827.

2 *Brande's Dict. Mat. Med. and Pharm.* 532.

4 *Bergius, Mat. Med.* ii. 649.

5 *Diseases of the Abdominal Viscera,* 42.

Officinal preparations.—*Decoctum Taxaraci*, L. E. D. *Extractum Taraxaci*, E. D.

LICHEN.

Cl. 24. *Ord.* 5. Cryptogamia. *Nat. ord.* Lichenaceæ.

Generic Char. *Male.* Scattered warts.

——————— *Female.* Smooth shields or tubercles, in which the seeds are imbedded.

Species 1. Cetraria *Islandica*, Iceland or Eringo-leaved Liverwort. *Eng. Bot.* 1330. *Flor. Danica*, 155. *Regnault, Observations on Pulmonary Consumption. Woodville's Med. Bot. 3d edit. p.* 803. *t.* 271. *Acharius Lichenographia.*

Species 2. Rocella. See *Rocella.*

CETRARIA ISLANDICA.

Officinal. CETRARIA, *Edin. Lond.* CETRARIA ISLANDICA, *Dub.* Iceland Liverwort or Iceland Moss.

Syn. Lichen d'Islande (*F.*), Isländisches moos (*G.*), Yslandsch moos (*Dutch*), Islandsk moss (*Dan.*), Islands mossa (*Swed.*), Liquen Islandico (*S.*), Musgo Islandico (*Port.*), Lichene Islandico (*I.*), Islandskoi moch (*Russ.*).

This species of Lichen is an indigenous perennial. It is very abundantly found in Iceland, and in the north of Germany; and is more or less common on all the heaths and mountains of the Highlands of Scotland, and of the north of Europe.[1] It grows to the height of two or three inches only, and has a rugged, bushy aspect. The thallus is dry, coriaceous, lobed, and laciniated, the lobes being subdivided and notched, resembling in appearance a buck's horn; but concave above, and convex beneath: their surface is smooth, shining, and blistered; the margins beset with short, very minute, rigid, parallel hairs: and the colour of the whole is greenish yellow, or greyish brown. The *apothecia* are brown, appressed and flat, with a border formed of the thallus and inflexed.

This plant is used in Iceland and Lapland as an article of diet; being boiled in broth or milk, after being freed from its bitter by repeated maceration in water; or dried and made into bread. It is brought in considerable quantity to this country for medicinal purposes.

Qualities.—The dried lichen differs very little in its appearance from the recent plant. It is inodorous, and has a bitter mucilaginous taste; it is neither very tough nor very brittle, but is not easily pulverised. When macerated in water it absorbs more than its own weight of the fluid, and the blisters appear like little white, opaque glands, while the other parts of the plant are diaphanous. If the water employed in the maceration be warm, it acquires a strong bitter taste, very similar to that of an infusion of quassia.

[1] It grows abundantly in the Asturias.—*Journ. de Physique*, 1806.

The macerated lichen boiled in water affords a yellow-coloured inodorous decoction, which thickens as it cools, and becomes a tremulous jelly resembling starch, but without any viscidity. After some time this jelly cracks, separates from the watery part, and dries into semi-transparent masses, which are not soluble in cold water, but soluble in boiling water; and from which it is again precipitated by infusion of galls. It throws down a purplish precipitate with sesquichloride of iron; a white with diacetate of lead; and a green with sulphate of copper. According to the analysis of Proust, 100 parts of lichen afford 64 parts of a substance insoluble in hot water, somewhat resembling *vegetable gluten;* 33 parts of a matter soluble in hot water, resembling *starch;* and three parts of a *bitter extractive principle.*[1] According to Dr. John the components are, *inuline* 8, *mucilage* 40, *extractive* 10, *green resin* 1·5, *saline matter* 4·5, and *insoluble matter* 37·5 parts. A more recent examination has been made by Berzelius[2], who procured three per cent. of bitter principle, which in its pure state is of a pale yellow almost white colour, pulverulent, light and intensely bitter. It is more soluble in alcohol than in water. Hydrochloric acid colours it deep blue. It has been termed *Lichenin.* It seems to be a modification of fecula. The fecula of the lichen does not strike a true blue colour with tincture of iodine: hence it is supposed to be inuline. A principle having acid properties, and named *Cetraric acid,* or *Cetrarine,* has been found in this lichen: it can be obtained in white acicular crystals, soluble in hot alcohol and ether, almost insoluble in water, forming compounds with bases, from which it is again separated by stronger acids. Its compound with peroxide of iron is of a red colour.

Medical properties and uses.—Iceland liverwort is tonic and demulcent. From some remarks of Linnæus, made in 1737 in the Flora Lapponica, it would appear that the Danish physicians had long before that time employed this lichen, and found it efficacious in hæmoptysis, and pulmonary complaints; but it did not excite the attention of even the continental physicians till after Scopoli's observations on it, in 1769, were published; and some years have now passed since it was known as a remedy in this country. Its virtues for the cure of phthisis have been very highly extolled; but experience has not confirmed the truth of the praises which have been lavished on it.[3] Its supposed specific effects are said to depend on the combination of its tonic, bitter, and its demulcent properties. As a demulcent it is certainly superior to the mucilages; and, owing to the bitter principle it contains, its decoction affords all the good effects that can be obtained from the other

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[1] *Journ de Physique,* 1806. [2] *Ann. de Chim.* xi. 277.

[3] It still possesses a high reputation as a remedy for phthisis by the natives of Iceland.—*Mackenzie's Travels,* 4to. *Appendix,* p. 411.

demulcents, and the mucilages, without loading the stomach. It allays tickling cough and relieves oppressed breathing; involves the acrid matters contained in the stomach and bowels which often induce diarrhœa; and renders more bland the whole mass of animal fluids, so as to mitigate hectic fever, while, at the same time, it tends to invigorate the digestive organs. Still, however, its efficacy in phthisis is very circumscribed; but the circumstances above enumerated ought not to be overlooked, nor the Iceland lichen regarded, as it often is, as a demulcent not more worthy of notice than the other articles of the same classes. Besides phthisis, it has been also found useful in debilities after acute diseases, and in emaciations, particularly those arising from the great discharge of ulcers; in diarrhœas, dysentery, and hooping-cough.

It is generally exhibited in the form of decoction (see *Preparations*, Part III.); but as the bitter proves hurtful in acute inflammation, that ingredient must be partly separated. This is effected by cutting or pounding the lichen, macerating it in several waters, and then, after boiling it for ten minutes, and decanting off the water, boiling it to the form of a mucilage in a fresh portion of water.

Officinal preparations.—*Decoctum Cetrariæ*, L. *Decoctum Lichenis Islandici*, D.

LIMONES. See *Citrus.*

LINUM.[1] *Spec. Plant. Willd.* i. 1533.

Cl. 5. *Ord.* 5. Pentandria Pentagynia. *Nat. ord.* Linaceæ.

G. 590. *Calyx* five-leaved. *Petals* five. *Capsule* five-valved and ten-celled. *Seed* solitary.

* *With alternate leaves.*

Species 1. L. *usitatissimum.* Common Flax. *Med. Bot. 3d edit.* 566. *t.* 202. *Smith, Flora Brit.* 342. *Curtis, Lond. fasc.* 5. *t.* 22. *Hayne,* viii. 17.

** *With opposite leaves.*

Species 26. L. *catharticum.* Purging Flax. *Smith, Flora Brit.* 344. *Eng. Bot.* 382. *Hayne,* viii. 18.

1. LINUM USITATISSIMUM.

Officinal. LINI SEMEN, *Lond. Edin. Dub.* LINA FARINA, *Edin.* Linseed, and Linseed meal.

Syn. Grains de Lin (*F.*), Leinsaamen Flachsaamen (*G.*), Vlas (*Dutch*), Hör (*Dan*), Lin (*Swed.*), Len (*Pol.*), Len (*Russ.*), Alleverei (*Tam.*), Tokhemtukan (*Pers.*), Bidgierammu (*Malay*), Semi di Lino (*I.*), Laxor (*S.*), Linhaça (*Port.*), Buzruk (*Arab.*), Tisi (*H.*), Atasci (*San.*).

The common flax is an annual plant flowering in July. It is

[1] Λινον Dioscoridis.

supposed to have been originally brought from those parts of Egypt which are annually inundated by the rising of the Nile; but it is now found growing wild in this country, and is cultivated in most parts of Europe. The root is simple and fibrous. The stem is erect, round, smooth, slender, and leafy; branched, with a panicle at the summit, and rising about two feet in height. The leaves are small, lanceolate, entire, obscurely three-nerved, smooth, sessile, standing nearly upright, and alternate on both the stem and branches. The flowers are petiolate: the calyx persistent, composed of five sharp-pointed, keeled, trinerved, and ovate sepals; and the corolla consists of five notched, oblong, sky-blue, streaked petals, which spread into funnel-formed blossoms. The filaments are white, dilated, and slightly united at the base; the germen is ovate, and crowned with five blue, thread-like, spreading, reflected stigmas. The capsule is globular, the size of a common pea, crowned with a sharp spine, formed by the junction of the spines of the valves in one point, and containing in each cell an elliptical shining seed.[1]

Although this plant is extensively cultivated in Britain, yet the greater part of the linseed used here is brought from the Baltic. The seed ripens in September, and the plant is then pulled up as soon as the heads begin to change brown and hang downward, otherwise the seeds are soon scattered. The best seeds, however, are those which spontaneously separate. The quantity of seed procured from an acre of ground is from ten to twelve bushels.

Qualities. — These seeds are inodorous, and have an oily, mucilaginous, sweetish taste. They are small, flat, oval, and covered with a smooth, shining, brown-coloured cuticle, which abounds with a mucus, that can be extracted pure by infusion in boiling water. By expression, they yield about one fifth of their weight of fixed oil. To obtain the oil, the seeds are heated in iron vessels and then pressed, or pressed without heat. It is deep brown when first drawn, and is bleached by adding two ounces of litharge to each gallon of oil, and after subsidence, half a pint of oil of turpentine, and exposing the mixture to the sun; but, if extracted without heat, the oil is much paler in colour, and has less odour and taste, the quantity then obtained is smaller. The mucus of linseed is colourless, insipid, inodorus, slightly acid from free acetic acid, and resembles in its viscidity mucilage of acacia gum; but differs from it in the following particulars: — alcohol precipitates it in white flocks; acetate and diacetate of lead throw down dense

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[1] The partitions of the cells are singular. Gærtner thus describes them: — "Dissepimenta membranacea, conduplicata, laminis suis extrorsum partitis, ita valvularum marginibus inserta, ut, cum hæ dehiscunt illæ corii follis adinstar explicentur:" and adds, "Dissepimentorum in radiola atque lino fabrica, hactenus sine pari est, et essentialem hujus generis præbet characterem." — *De Fructibus*, ii. 147.

precipitates; but infusion of nutgalls, chlorine, and persulphate of iron produce no sensible effect, nor is it rendered blue by iodine. Nitric acid converts it into mucic acid. Guerin found linseed mucilage to contain both a *soluble* and an *insoluble principle:* the former resembles pure *gum,* the latter differs from both *cerasin* and *bassorin.*[1] According to Meyer, linseed yields 11·265 of *fat oil,* 0·146 of *wax,* 2·488 of *acrid soft resin,* 0·550 of *colouring matter,* 1·917 of *extractive* and some *salts,* 10·884 of *sweet extractive,* 6·154 *gum,* 15·120 *azotized mucilage,* 1·480 *starch,* 2·782 *albumen,* 2·937 *gluten,* and 44·382 *husk* and *emulsion.*[2] The oil exists in the cotyledons.

Medical properties and uses.—Linseed is emollient and demulcent. The mucus obtained by infusion is a cheap and very useful demulcent in catarrh, pneumonia, diarrhœa, and dysentery; visceral inflammations, calculus, gonorrhœa, ardor urinæ; and during the exhibition of bichloride of mercury. When the seeds are boiled in water, the mucus is obtained in union with a portion of the oil; forming a useful local remedy when given in the form of enema in abrasions of the intestines and tenesmus, particularly in the advanced stage of puerperal fever, when the offending matter in the bowels stimulates to frequent and involuntary stools: but the portion thrown up must be small in quantity.[3] The seeds, ground into powder or meal, and simply mixed with boiling water, form an excellent poultice; valuable on account of the facility with which it is made. When mixed with lime-water it forms an excellent emollient liniment, useful in burns and scalds, and in eczematous eruptions.

Officinal preparations.—*Infusum Lini compositum,* L. *Infusum Lini,* E. *Decoctum Lini compositum,* D. *Cataplasma Lini,* L.

LINI OLEUM, *L. E. D.* Linseed oil.

Syn. Huile de graine de Lin (*F.*), Leinöhl (*G.*), Olio de Lino (*I.*), Azéyte de Laxoe (*S.*)

This oil has a yellow colour, but its depth differs much according to the mode of its extraction. Its specific gravity is about ·930. It is soluble in alcohol and ether; and, by exposure to the air, absorbs oxygen, and forms a varnish: hence it is named a drying oil. It is composed of margarine dissolved in oleine.

Medical properties and uses.—It is emollient, demulcent, and slightly laxative: it is seldom employed as an internal remedy, but forms a useful application to burns, especially when combined with lime-water. It is contained in the Linimentum Calcis of the Edinburgh College.

2. LINUM CATHARTICUM.[4]

Officinal. LINUM CATHARTICUM, *Edin.* Purging Flax.

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[1] *Ann. de Chym. et Phys.* xlix. 203.
[2] *Gmelin, Handb. d. Chim.* ii. 1259.
[3] *Denman's Midwifery,* ii. 251.
[4] Λινοκάρπος Græcorum.

Syn. Lin purgatif (*F.*), Purgier Flachs (*G.*), Purgeervlasch (*Dutch*), Liden Vildhör (*Dan.*), Villhōr (*Swed.*), Lino purgativo (*I.*), Cantilagua (*S.*), Linho purgante (*Port.*)

This is an indigenous annual plant, found on dry and hilly pastures, flowering from June to August. The root is small, and sends up several delicate, leafy, erect, smooth stems, simple at the base, but dichotomous above, many-flowered, and from three to nine inches high. The leaves are opposite, of a sub-elliptical, lanceolate shape, obtuse, entire, green on the upper surface, and glaucous beneath. The flowers are small and white; nodding before they open, after which they rise and stand erect. The leaves of the calyx are pointed, serrated, and one-nerved; in the corolla, the petals are obovate, acute, white, and spreading; the filaments are united, forming a circle round the lower part of the germen, which is furnished with capitate stigmas. The seeds are yellow and shining.

Qualities.—Purging flax, whether in the recent state or the dried, is nearly inodorous, and has a bitter sub-acrid taste. Water extracts the virtues of the plant, which communicates to it, besides its sensible qualities, a yellow colour. Macerated in ether, purging flax affords a green tincture, which deposits, when it is evaporated on the surface of water, a green *bitter resin*, and an *extractive matter*, on which the virtues of the plant seem to depend.

Medical properties and uses.—This species of flax was celebrated as a purgative by Gerarde. It may be given in the form of infusion, made with ʒ ij. of the dried plant, and O j. of boiling water, of which f ℥ ij. is a dose: of the dried plant in powder, ʒ j. may be taken for a dose. But it possesses no particular advantages, and only swells unnecessarily the list of purgatives.

LITHARGYRUM. See *Plumbi oxydum.*

LIXIVUS CINIS. See *Potassæ carbonas.*

LOBELIA. *Spec. Plant. Willd.* i. 937.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Lobeliaceæ.

G. 342. *Calyx* five cleft. *Corolla* one irregular petal. *Anthers* cohering. *Capsule* inferior, two or three celled.

Species 29. L. *inflata.* LOBELIA, *Lond. Edin. Dub.* Lobelia, Inflated Lobelia, Indian Tobacco. *Barton. Med. Bot.* i. 181. *Bigelow's American Botany,* i. 177.

This species of Lobelia is a native of the United States of America, growing as a common weed on the road sides, and in waste places. It flowers from July to October. It is an annual plant, with a fibrous root, and a solitary, erect, angular, hairy stem, about a foot high, branching above its mid height. The lower leaves are oblong, shortly petiolated, the upper are sessile, oval,

acuminate, and dentate-serrated. The flowers are small, numerous, in terminal racemes, axillary, and supported on short pedicels: the segments of the calyx are linear and pointed; the corolla has a labiate border, with the upper lip bifid, the lower trifid; and the curved tube of anthers incloses the stigma. The fruit is an oval, inflated, striated capsule, crowned with the persistent calyx, and containing, in two cells, numerous small, brown seeds.

The plant should be gathered in August, when it is turgid with a white, opaque juice: it should he carefully dried, and kept in the entire state in well-stopped bottles.

Qualities.—Lobelia inflata, in the state in which it is employed, has a slight odour; and, when much chewed, it imparts an acrid impression to the posterior part of the tongue and the palate, and causes nausea, and a flow of saliva. It yields its properties to water, alcohol, and ether. The watery infusion affords precipitates with chloride of tin, sulphate of iron, and lime-water, demonstrating the presence of *extractive* and *tannic acid* in it: but the other principles which it contains are yet unknown, as it has not been accurately analysed. According to Dr. Pereira[1], it contains a *volatile acrid principle*, an *acid*, *resin*, *chlorophylle*, *gum*, *extractive*, *woody fibre*, and, perhaps, *caoutchouc*. The powder is of a greenish colour.

Recently it appears that the active principle has been isolated, and called *Lobelina*. When pure, it occurs as a viscid, oily fluid, lighter than water, uncrystallizable, slightly soluble in water, but soluble in alcohol and ether; possessing an alkaline reaction; volatile, but not entirely without change; decomposed by caustic alkalies, forming salts with acids which are crystallizable in prisms and needles: the salts more soluble in water than the alkaloid; soluble also in alcohol, but little so in ether: they have no odour, but an acrid taste; precipitated by a solution of tannic acid.

A crystallizable acid, called *lobelic acid*, has also been found to exist in the plant, which is stated to form a salt with lobelina, also capable of crystallization. The ultimate composition of these bodies is unknown.

Medical properties and uses.—Lobelia is emetic, purgative, and in small doses diaphoretic, expectorant, and antispasmodic. When the leaves are chewed they cause vertigo, headach, tremors, nausea, and vomiting; and few medicines are followed by such debilitating effects. In large doses it operates as a powerful narcotic poison, resembling tobacco in the symptoms, and most hazardous when it does not vomit.

Lobelia was long employed by the Indians: it was introduced to the notice of the profession by the Rev. Dr. Cutler of Massachusetts. It has been chiefly employed in asthma; and is un-

[1] *Mat. Med.* vol. ii. p. 1339, 2d edit.

doubtedly useful when administered during the paroxysm: but I have never observed any advantage result from its employment during the intervals. Mr. Gordon, of Wilton, found it very useful in that species of the disease which has been termed May asthma. It has also been used, successfully, in croup, hooping-cough, and other affections of the lungs; but in these it is less beneficial than in asthma. D. Eberle[1], from observing the similarity of its action to that of tobacco, employed it in the form of enema in strangulated hernia; and he found its effects in every respect similar to those of that narcotic. The same physician, also, found it beneficial in croup.

Lobelia inflata is administered in the form of powder, in doses from four to twenty grains; in infusion made with ℥j. of the plant, and O ss. of boiling water, of which an ounce may be administered every half hour until nausea be induced; and also in the form of tincture.

Lobelina, given in doses of $\frac{1}{4}$ grain to a cat, produced vomiting and great depression, but the animal recovered. A grain injected into the stomach rendered the animal motionless, and the narcotic symptoms remained for fifteen hours, but it did not destroy the animal.

Officinal preparations. — *Tinctura Lobeliæ Etherea*, L. E. *Tinctura Lobeliæ*, L. E. D.

LUPULUS AND LUPULINA. See *Humulus*.

LYTTA. See *Cantharis*.

MAGNESIÆ SULPHAS, *Lond. Edin. Dub.* Sulphate of Magnesia. Bitter purging Salt.

Syn. Sulphate de Magnésie (*F.*), Schwefelsaure Magnesia, Bittersalz, Elsamer salz (*G.*), Englesk laxeersalt (*Dan.*), Bittersalt, Engelskt salt (*Swed.*), Sale amaro d' Inghilterra, Ossisolfato di Magnesia (*I.*), Sal Amarga, Sal de la Higuera (*S.*), Sal Cathartico amargo (*Port.*) Sernekislaia Magnesia (*Russ.*).

This salt is found native in a pure state[2]; but it is more commonly combined with gypsum[3] and other salts, and in solution in sea-water, and several mineral springs. It was first artificially obtained in England in 1675, by Dr. Grew, from the evaporation of the water of the Epsom spring: whence it was named *Epsom*

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[1] *Treat. of the Mat. Med.* i. p. 48. 2d edit.

[2] In the mercury mines of Idria it is found crystallized, and named by the Germans *Haarsalz.* According to Klaproth, it contains 1 per cent. of oxide of iron. (*Analyt. Ess.* 80.) It also abounds in the great caverns in the Alleghany mountains, in the United States of America.

[3] It is found in the gypsum quarries of Piedmont; and, as Proust relates, it abounds so much in Spain, that in Andalusia large tracts are covered with an efflorescence of it after floods. *Journ. de Physique*, xxxiii. 312.

salt: and in 1700 it was made in considerable quantity from two springs at Shooter's Hill, in Kent[1]; but the discovery of it in bittern, or the residual brine after the crystallization of sea-salt, soon opened a more copious source from which it might be obtained at all times; and for many years a great part of the sulphate of magnesia used in this country was manufactured from bittern. This substance consists chiefly of chloride of magnesium, chloride of calcium, some common salt, and a small portion of sulphate of lime; and, therefore, the sulphate of magnesia was obtained by decomposing the chloride by means of sulphate of iron, or sulphuric acid in some form, although some affirm that the sulphate is contained in the bittern, which only requires to be boiled down to a high point of concentration to yield the sulphate of magnesia, which is purified by a second solution and crystallization. Much of the sulphate of magnesia, however, now sold, is prepared from magnesian limestone, Dolomite[2], by a process invented by Dr. Henry, of Manchester: the Dolomite is first calcined, then treated with hydrochloric acid, which takes up the lime and leaves the magnesia, which is then converted into the sulphate. As it contains no chloride of magnesium, it attracts no moisture from the atmosphere, and does not deliquesce, like that prepared from bittern. This sulphate is sometimes adulterated with Glauber salt, which is made to resemble Epsom salt, by stirring the solution briskly when it is about to crystallize. It may be detected by precipitating the magnesia by pure ammonia, aided by heat; filtering, and evaporating the filtered fluid to dryness, by a heat sufficient to volatilize the sulphate of ammonia: if it contain Glauber salt, the soda will remain fixed.

Qualities. — Sulphate of magnesia is inodorous, and has a very bitter, nauseous, saline taste. It is usually in small needle-like quadrangular crystals, but the form of its larger and regular crystal is a quadrangular rhombic prism, terminated by two or four converging planes. When pure it effloresces; and is soluble in its own weight of water at 60°, increasing the volume of the fluid rather more than 4-tenths, or a solution of ℥j. of sulphate of magnesia in f ℥j. of water measures eleven fluid drachms and a quarter; it is more soluble in water at 212°. It is insoluble in alcohol. The formula for its composition is $Mg\,O,\ SO_3 + 7\,H\,O$. Heat causes the salt to melt and expels the water of crystallization; but one equivalent of this water is retained with much greater force than the rest. Its specific gravity is 1·66. It is decomposed by

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[1] It is also made in Bohemia from the mineral water of Seidlitz.

[2] In the neighbourhood of Genoa it is prepared by roasting a schistose rock which contains magnesia and sulphuret of iron; and then exposing it to the air under a shade for six months, occasionally watering it, and then lixiviating. Near Baltimore it is made by pulverizing a siliceous hydrate of lime, which abounds there, and saturating it with sulphuric acid.

the alkalies and their carbonates, by lime-water, the hydrochlorate of ammonia, chloride of barium, and lime, nitrate of silver, and the acetates of lead, which are therefore incompatible with it in prescriptions: but it is not precipitated by the sesquicarbonate of ammonia, although when phosphate of soda is added, immediately afterwards, a double phosphate of magnesia and ammonia is formed, and precipitates as a fine powder. The following characters of the salt are given in the London Pharmacopœia: "not deliquescent in the air, soluble in water: if sulphuric acid be dropped into this solution, no hydrochloric acid is evolved;" showing the absence of chlorides.

Medical properties and uses.—This salt is purgative and diuretic. It operates readily, without griping: and, notwithstanding its nauseous taste, is generally retained by the stomach when almost all other things are rejected, especially when it is administered in small, repeated doses, largely diluted, or united with acidulated infusion of roses. In these forms it is a useful purgative in hypochondriasis, colica pictonum, ileus, puerperal fever, and in all acute diseases. In small doses, combined with compound spirit of ammonia, and dissolved in the infusion of quassia or gentian, it has been found very useful in dyspepsia accompanied with costiveness. It is also used as an adjunct to stimulating clysters. By moderate exercise in the open air while taking this salt, the purgative effect is diminished, and its diuretic property increased. The dose is from ʒ ss. to ℥ ij. dissolved in water, gruel, or any other vehicle; and taken either at once, or in divided doses frequently repeated. It operates more beneficially and with less irritation when the solution is acidulated with diluted sulphuric acid.

MALVA. *Spec. Plant. Willd.* iii. 774.

Cl. 16. *Ord.* 6. Monadelphia Polyandria. *Nat. ord.* Malvaceæ.
G. 1290. *Calyx* double, the exterior three-leaved. *Capsules* numerous, one-seeded.
** *With angular leaves.*
Species 43. Malva *sylvestris.*[1] Common Mallow. *Med. Bot. 2d edit.* 554. *t.* 199. *Smith, Flora Brit.* 740. *Eng. Bot.* 671. *Hayne*, ii. 28.
Officinal. MALVA, *Edin.* Mallow.

Syn. Mauve sauvage (*F.*), Waldmalve, Cappel Kraut (*G.*), Malvone (*I.*), Malvas (*S.*), Malva (*Port.*), Maluwe (*Dutch*), Kattostgras (*Swed.*), Katteat (*Dan.*), Presvirki (*Russ.*).

This is a perennial, indigenous plant, common over all Europe, growing on waste grounds and at the sides of roads; and flowering from June till August. The *root* is thick, fusiform, branching, and of a whitish colour. The *stem* frequently erect, branched,

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[1] Μαλαχη Græcorum. Malva, quasi molva, quod alvum moliat.

round, hollow, hairy, and many flowered. The *leaves* are alternate, petiolate, divided into five, six, or seven lobes, acute, plaited, somewhat hairy, and crenate; the upper ones are almost palmate. At the base of each footstalk are two *stipules.* The *flowers,* which stand on slender, hairy peduncles, are large; composed of five obcordate, purple petals, adhering by their claws, three times longer than the calyx, which is hispid. The capsules are from ten to fifteen in number, of a rounded kidney-form, crustaceous, brittle, close all round, of a dark straw-colour, excavated, and wrinkled on the back. The seeds are kidney-shaped, ash-coloured, and furnished with an arillus which opens inwardly.

Qualities.—Common mallow is inodorous, and has a weak, herbaceous, mucilaginous taste. The decoction, which is mawkish and disagreeable, is precipitated by acetate of lead, deepened in colour by the salts of iron, and is little more than a simple solution of vegetable mucus.

Medical properties and uses.—This herb is more demulcent and emollient than the root. Its decoction is employed in dysentery, ischuria, strangury, and nephritic complaints, but it is in every respect inferior to that of althea root. It is chiefly used in the form of enema in tenesmus and nephritic colic; and in that of cataplasms and fomentations in phlegmonous inflammation, and excoriations of the skin.[1]

MANGANESIUM. Manganese.

This is a brittle, greyish-white, brilliant metal, somewhat resembling iron in its external aspect, of a granular texture, and possessing neither ductility or malleability. It has not been discovered native in its metallic state[2], but its ores are found in most of the countries of Europe, both in primitive and transition mountains. It has neither odour nor taste; is softer than cast-iron, and is not magnetic. Its specific gravity is 8·013.[3] It rapidly attracts oxygen from the air, loses its lustre, and progressively becomes violet, brown, and ultimately black. It rapidly decomposes water. Its equivalent number is 27·67. It is very abundantly found in the state of the grey and the black oxide. Manganese in the ore, both in primitive and transition mountains, is found—

A United with oxygen.

i. oxidized. Sp. 1. *Grey manganese ore.*

Var. *a.* Radiated. *b.* Foliated.

c. Compact. *d.* Earthy.

2. *Black manganese ore.*

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[1] An infusion of the flowers may be used as a test for acids and alkalies; the former redden, the latter green it.

[2] La Perouse suspected that he had found manganese in a metallic state; but his opinion was not confirmed.

[3] John, vide *Gehlen's Journ.* iii. p. 460.

a. and combined with sulphur.	3. *Sulphuret of manganese.*
b. ——————— with phosphoric acid and iron.	4. *Phosphate of manganese.*
d. ——————— with silica and iron.	5. *Silicate of manganese.*

Of these species the two first only have been introduced into the list of materia medica.

Officinal. MANGANESII BINOXYDUM, *Lond.* MANGANESII OXYDUM[1], *Edin.* MANGANESII PEROXYDUM, *Dub.* Manganese, or more properly, Binoxide of Manganese. Pyrolucite.

Syn. Oxide de Manganese (*F.*), Braunstein (*G.*), Branstoen (*Dan.*), Perekis margantsor (*Russ.*), Ossido di Manganese (*I.*), Manganesa gris (*S.*).

Under the name of black or binoxide of manganese are implied all the varieties of the first and second species. It was discovered in England by Boyle, in the beginning of the 17th century, but was regarded as a modification of iron ore, till the separate experiments of Scheele and Bergman, published in 1774, proved it to be an oxide of a peculiar metal; which Gahn afterwards succeeded in obtaining in its metallic state, and to which he gave the name of Manganesium. It is found in Great Britain, Germany, Switzerland, the north of Italy, and in France.

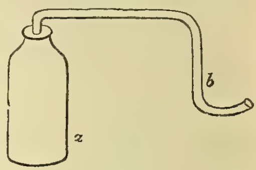
The greater part of the binoxide of manganese used in England is obtained near Exeter in Devonshire, in Cornwall, and at Howth, near Dublin. The best is furnished by Upton mine, near Exeter. Good binoxide of magnanese has lately been procured in Scotland. It occurs crystallized and amorphous; and is generally in combination with small portions of oxide of iron, carbonate of lime, silex, and baryta.

Qualities.—Binoxide of manganese differs in its external characters. It is seldom pure, being often mixed with oxide of iron, carbonate of lime, and siliceous and aluminous earths. Its usual colour varies from iron-grey to black; when crystallized it is shining; but, when amorphous, it is devoid of lustre. It generally occurs massive; but sometimes its texture is radiated, or foliated, or in minute acicular prisms grouped together. None of the varieties are very hard; all of them are brittle, and several of them soil the fingers. Their specific gravity varies from 3·5 to 4·7. According to Berzelius one hundred parts of the binoxide consists of 64·02 of metallic manganese, and 35·98 of oxygen. Exposed to

[1] This term is improperly used by the Edinburgh College: for although the black oxide was originally named *oxide of manganese*, and is still so named in commerce, yet, in a professedly scientific work, more accuracy of nomenclature is required. It ought to be Binoxydum. It is the *pyrolusite* of mineralogists.

the heat of ignition, all the varieties afford oxygen gas; and, when mixed in powder with sulphuric acid, they afford it at a boiling temperature. Treated with hydrochloric acid, chlorine is evolved, and the greatest consumption of binoxide of manganese is to form this gas, which is employed in bleaching. Its composition is represented by the formula Mn. O^2.

Medical properties and uses.—This oxide has been administered internally as an excitant, in syphilis.[1] It causes a disease not unlike paraplegia, caused by the poison of lead, in workmen employed in grinding it.[2] But it is chiefly used for procuring oxygen and chlorine gas; and for fumigation in cases of infection. To procure oxygen gas, a portion of the oxide, broken into small pieces, is put into an iron retort (*a*), fitted with a long curved tube (*b*), the extremity of which being placed under an inverted jar filled with water in a pneumatic trough, the retort is put into a common fire, and exposed to a full red heat.



The caloric at this high temperature weakens the affinity between the manganese and the oxygen, with which it is united, and causing it to assume a gaseous state, the oxygen gas is transmitted through the water, and collected in an inverted jar in a pneumatic trough, leaving oxide of manganese in the retort.[3] From the necessity of oxygen for carrying on the process of animal respiration, much benefit was expected from the breathing oxygen gas in disease; but experience has not confirmed the high expectations which were formed of its powers. It certainly increases the force and velocity of the pulse; and has been exhibited with seeming advantage in asthma, chlorosis, scrofula, typhoid fevers, and other diseases of debility. Diluted with from ten to twenty parts of atmospheric air, one or two quarts of it may be breathed at intervals in the course of the day.

But a more certain benefit is obtained from the use of this oxide of manganese in fumigations. Medicine is indebted to Morveau for the discovery of this mode of destroying infection: and the numerous instances in which it has proved beneficial have fully established its use. For a fumigation the following ingredients are required: dried common salt 50 parts, or ℥ivss., oxide of manganese in powder 44 parts, or ℥iij., sulphuric acid ℥xij., and water ℥vj.: the water and acid must be previously mixed together, and then, after the mixture is cold, poured over the other ingredients in a China or porcelain basin. The doors and windows

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[1] *Kapp, Hufeland's Journ. Bd.* xix. st. 1. § 176.

[2] *British Ann. of Med.* Jan. 1837, p. 41.

[3] Oxygen is most readily procured from a mixture of binoxide of manganese and chlorate of potassa, put into a glass retort and heated by a spirit lamp.

of the room which is to be fumigated must be closely shut for two hours after the charged basin has been placed in it; then thrown open, and a current of air allowed to pass through the room. Chlorine is extricated by this process, and destroys the infectious and contagious matter floating in the atmosphere and attached to the walls and floors of the infected rooms. All metallic furniture should be previously removed. Chlorine, largely diluted, is now also employed in phthisis and asthma, inhaled into the lungs.

MANNA. See *Fraxinus.*

MARANTA. *Spec. Plant. Willd.* i. 13.

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. ord.* Marantaceæ.
G. 10. *Calyx* three-leaved. *Corolla* trifid. *Nectary* three-parted, with the third superior lacinia anther-bearing.
Species 1. M. *arundinacea.* Arrow-root Plant. *Brown's Jamaica,* 112. *Loudon's Encyc. of Plants,* p. 2. *Roscoe's Monand. pl.* 25. *Hayne,* ix. 25.
Officinal. MARANTA, *Lond. Edin. Dub.* The fecula of the tubers. Arrow-root.[1]

Syn. Amerikanisches Starkmehl, Arrowmehl (*G.*), Koramaoo (*Tam.*), Tikhar (*H.*)

This plant is a native of South America, the West Indies, and the southern states of North America: it has lately been introduced into Ceylon (*Ainslie*). The rhizome is perennial, tuberose, fleshy, horizontal, cylindrical, and furnished with long, white fibriles. The stems are annual, rising three feet in height, slender, jointed and branching, giving off at the joints alternate sheathing leaves about four inches long, ovato-lanceolate. The flowers are in loose terminal panicles, furnished at each ramification with a solitary, linear bract. The calyx consists of three small, lanceolate sepals: the corolla is tubular, white, with the outermost segments small; the innermost are larger and slightly emarginate.

For preparing the arrow-root, the tubers are dug up when they are a year old, washed, beaten to a pulp, and agitated in water so as to separate the fibrous from the feculaceous part. The milky fluid is strained through coarse linen, and left at rest until the fecula subsides, when the supernatant fluid being decanted, the fecula is well washed with fresh portions of water, and dried in the sun.[2]

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[1] The name arrow-root is derived from the polished stems of the plant being employed by the Indians for making arrows.

[2] Maranta *Allonya* and *nobilis;* M. *Indica,* which, as its specific name implies, also furnishes West India arrow-root. The Curcuma *angustifolia* of Roxburgh supplies much of the East Indian arrow-root; and some has lately been brought from the Sandwich Islands, which is the production of the Tacca *pinnatifida.* In the Island of

Qualities. — Arrow-root is a white, inodorous, insipid, light powder. It is a pure starch; forms a mucilage when it is boiled with water, which strikes a blue colour with iodine. A table-spoonful of the powder will form a pint of the mucilage. In making it, the powder should first be rubbed with a little cold water, then boiling water poured over it, with constant agitation, and the whole boiled for a few minutes. This mucilage is precipitated by astringent infusions and decoctions.

Arrow-root is often adulterated with other starches, especially with that from the tubers of the Solanum tuberosum, or common potatoe: the adulterations can be generally discovered by the aid of the microscope.

Medical properties and uses. — Arrow-root forms, when it is boiled with water or with milk, a mild, demulcent nutriment, well adapted for children, and for the sick and convalescent.

The mucilage may be combined with lemon juice and sugar; or with wine, or beef tea, according to circumstances.

MARMOR ALBUM. *See* Calx.

MARRUBIUM. *Spec. Plant. Willd.* iii. 109.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.
G. 1111. *Calyx* salver-shaped, rigid, ten-streaked. *Corolla,* upper lip bifid, linear, and straight.
** *With ten-teethed calyces.*
Species 8. M. *vulgare.*[1] White Horehound. *Med. Bot. 2d edit.* 332. *t.* 118. *Smith, Flora Brit.* 636. *Eng. Bot.* 410.
MARRUBIUM. Horehound leaves. Not now officinal.

Syn. Marrube blanc (*F.*), Weisser andorn (*G.*), Witte andoorn (*Dutch*), Ilvidmarru (*Dan.*), Andorn (*Swed.*), Szanta Biala (*Pol.*), Marrubio (*I.*), Marubio blanco (*S.*), Marrojos blanco (*Port.*), Schandra velaia (*Russ.*).

White horehound is an indigenous, perennial plant, growing in waste grounds, and flowering in July. The root is fibrous, sending up numerous stems, about eighteen inches high, quadrangular, erect, and very downy. The leaves are in pairs, upon broad foot-stalks, rounded, crenate, wrinkled, hoary, and woolly on the under surface. The flowers are white, in crowded axillary whorls, sessile, villous, and furnished with setaceous, awned bracts. The calyx is tubular, furrowed, and divided at the margin into ten narrow segments, which are hooked at their points; the corolla is tubular,

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Portland the roots of the Arum *maculatum*, which abounds in all the fallow fields, are gathered by the women, and manufactured into what is called "British arrow-root."

[1] Πρασιον Dioscoridis. Lemery says the name is derived from the Hebrew word *Marrob*, which means a bitter juice.

compressed, opening at the mouth into two lips, the upper of which is narrow and cloven; the under broader, reflected, and three-cleft, with the middle segment broad and scalloped. The filaments are two long and two short, with simple anthers, within the tube; and the style is slender, with a cloven stigma. The seeds are four, at the bottom of the calyx.

Qualities. — Horehound dried has an aromatic odour, which, however, is soon lost by keeping: it has a durable bitter taste. Both water and alcohol extract its virtues. The infusion reddens tincture of litmus, gives a deep olive-green precipitate with sulphate of iron, a brown with nitrate of silver, and a pale yellow with bichloride of mercury: acetate and diacetate of lead do not affect it. The active principles of horehound, therefore, appear to be a *bitter extractive, volatile oil,* and *tannic acid.*

Medical properties and uses. — Horehound is tonic, diuretic, and laxative. It was formerly much used in pulmonary affections, and is still a popular remedy for asthma and obstinate coughs. It is aperient when taken in large doses, and was consequently recommended in jaundice, cachexies, menstrual obstructions, and hysteria; and although its powers are not found by modern practitioners equal to the account which the ancients gave of them, and therefore it is very seldom prescribed, yet we have seen decided advantage from its exhibition in phthisis. The dried herb may be given in powder, in doses of from ʒss. to ʒj.; or of the expressed juice of the fresh plant from f ℥ss. to f ℥jss. may be taken twice or thrice a day. It is also used in the form of infusion.

MASTICHE. See *Pistachia lentiscus.*

MATICO. See *Artanthe elongata.*

MEL. *Lond. Edin. Dub.* Honey. Saccharine secretion of Apis mellifica.

Syn. Miel (*F.*), Gemeiner Honig (*G.*), Honning (*Dan.*), Honung (*Swed.*), Honig (*Dutch*), Mel (*Russ.*), Tayn (*Tam.*), Shadid (*Pers.*), Mele (*I.*), Miel (*S.*), Mel (*Port.*), Ussub (*Arab.*), Medhú (*H. San.*), Komagun (*Bornouil*), Ammah (*Mandara*), Tejee (*Beyharini*).

Honey is collected by bees from the nectaries[1] of flowers, in which it is abundantly secreted; but it probably undergoes some change within the insect before it is ejected by it, and deposited in the comb. The flavour of honey varies according to the nature of the flowers from which it is collected: the honey of Minorca, Narbonne, and England are known by their flavours; and the honey

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[1] The nectary is a glandular organ of the corollas of flowers. In many flowers it forms part of the petals themselves; in others it is a distinct organ. It is not easy to assign the use of honey in the vegetable economy, unless it be intended as food to the fertilizing organs.

prepared in different parts even of the same country differs.[1] It is separated from the comb by dripping and by expression: the first method affords the purest sort; the second separates a less pure honey; and a still inferior kind is obtained by heating the comb before it is pressed. When obtained from young hives, which have never swarmed, it is denominated virgin-honey. It is sometimes adulterated with flour, which is detected by mixing it with tepid water: the honey dissolves, while the flour remains nearly unaltered. The London College gives directions for ascertaining its freedom from starchy matters, by ordering it to be dissolved in water at about 170° F., then cooled, and mixed with iodide of potassium and dilute nitric acid, when no blue colour should be exhibited.

Qualities. — Honey has a peculiar saccharine, aromatic odour; and a sweet, acidulous, sharp taste. In colour it varies from white or a yellowish white to a pretty deep shade of amber or golden yellow; in consistence, from the fluidity of limpid oil to the stiffness of soft suet: and when the more limpid kind is kept, it partly crystallizes into little irregular concretions. It contains *crystallizable grape sugar, uncrystallizable sugar, mucilage, wax,* and an *acid;* and occasionally some volatile oil, as in the perfumed honey of the Crimea. Honey is soluble in water, and partially in alcohol; and, like sugar, passes into the vinous and acetous fermentation. When heated over a slow fire it throws up a scum; and if the heat be continued so as to produce evaporation, the vapour is inflammable, and the honey becomes brown, and acquires an unpleasant flavour, which is strong in proportion to the degree of temperature employed. Lowitz found that the addition of charcoal to a solution of honey deprives it of odour, taste, and colour; but the colour again returns when the solution is evaporated. Cavezzali separated the sugar by first melting the honey, then adding carbonate of lime (egg shells) in powder as long as any effervescence appeared; and, after separating a scum which forms by rest, filtering it and setting it aside to crystallize. The crystals he purified by washing them with alcohol.[2] Proust separated it from a ready-granulated honey by the action of alcohol.[3] Nitric acid converts honey into oxalic acid.

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[1] In some parts of Asia and America a poisonous honey is met with, which probably owes its deleterious properties to the flowers on which the bees feed. It is supposed that the honey extracted from the Azalea *pontica,* and some species of the genera kalmia, andromeda, and rhododendron are poisonous: and that the honey carried from the blossom of the Azalea *pontica* was that which poisoned the Greek soldiers in the celebrated retreat of the ten thousand through Pontus. In the island of Bourbon, honey of a green colour, and very fragrant, is procured, and bears a high price in India, to which it is chiefly exported. But bees do not sip the honey secreted in all flowers; thus they refuse that of the crown imperial, Fritillaria *imperialis,* and of the oleander, Nerium *oleander,* which kills thousands of flies.

[2] *Annales de Chimie,* xxxix. 110.

[3] *Journ. de Physique,* lix. 428.

Medical properties and uses. — Honey is laxative, and externally detergent and stimulant. Simple honey is seldom ordered as an internal medicine[1]: indeed, when freely eaten as food, it passes off quickly by stool, and induces colic in some habits; on which account simple syrup should perhaps be preferred in all cases for forming medicinal preparations for internal use. As a local stimulant, it is employed in glysters; and forms an excellent adjunct to gargles in cynanche and in aphthous ulceration of the mouth and fauces. It is also a useful detergent to foul ulcers.

Officinal preparations. — *Mel depuratum,* D. *Mel Boracis,* L. E. D. *Mel Rosæ,* L. E. *Oxymel,* L. D. *Oxymel Scillæ,* L.

MELALEUCA. *Spec. Plant. Willd.* iii. 1428.

Cl. 13. *Ord.* 3. Polyadelphia Icosandria. *Nat. ord.* Myrtaceæ.

G. 1392. *Calyx* five-cleft, half superior. *Corolla, petals* five. *Filaments* numerous, connate in five bodies. *Style* one. *Capsule* half-covered, three-celled.

Species Nova. M. *minor.*[2] Cajuputi Melaleuca, *Rumphius* (arbor alba minor). *Herbar. Amboinense,* ii. *lib.* 2. *cap.* 26. *t.* 17.

Officinal. CAJUPUTI OLEUM, *Lond. Edin. Dub.* Cajuputi oil. Oil distilled from the seeds.

Syn. Cajeput (*F.*), Kajeputohl (*G.*), Cajeput (*I.*), Cajuputa (*Malay*), Kyäpootie tylum (*Tam.*), Kyupootie ka tail (*Duk.*).

The tree which yields this oil is a native of Amboyna, Java, and the south part of Borneo, where it grows very abundantly in dry arid places. It is named cajuputa[3] in the Malay language; and also by the natives *daun kitsjil,* and *caju-kilan.* It is a small tree, in some situations rather a shrub than a tree, with a running root, often arched, and half above the ground. The stem is covered with a rough, pale, lamellated bark. The leaves are alternate, on short petioles, not unlike those of the willow, about three inches long, and a little more than half an inch broad, lanceolate, and somewhat falcated; entire, smooth, three-nerved, firm, dry, fragile, of a pale yellowish-green colour, and having a very grateful odour. The flowers are white, sessile, and accompanied with minute ovate bracts. The calyx is tubular, five-toothed, and one half deciduous; the petals are roundish, and concave; and the bundles of the filaments, which are long, filiform, and bearing small ovate anthers, are fixed within the tube of the calyx. The germen is inferior,

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[1] The ancients prized it highly as a medicine, as upon it Jupiter was nourished.

[2] As the specimens of the tree which yields the true cajuputi oil, which were sent home by Mr. Christopher Smith, differ from the M. *Leucadendron,* which was formerly supposed to yield it, and agree with the *arbor alba minor* of Rumphius, Dr. Maton and Sir J. E. Smith have fixed this as a new species, under the name of M. *Cajuputi.*

[3] Kayu-puti means in English *white wood;* thence Rumphius terms it *arbor alba. Mat. Med. of Hindostan.*

roundish, crowned with a simple slender style longer than the filaments; and becomes a three-celled capsule, containing many small, oblong, angular seeds.[1]

To prepare the oil, the leaves of Melaleuca *minor* are collected on a hot dry day in autumn, and put into thoroughly dry bags; in which, nevertheless, they soon spontaneously heat and become moist, as if macerated in water. They are then cut in pieces, infused in water, and left to ferment for a night; after which they are distilled. The quantity of oil they yield is very small, scarcely more than three fluid drachms being obtained from two bags of leaves.[2] When newly drawn it is very limpid, pellucid, and volatile; and Rumphius says, smells strongly of cardamoms, but it is more pleasant. It was formerly imported in copper flasks or canisters; but now it is often brought home in quart glass bottles. On account of the high price of real cajuput oil, it is said to be often adulterated with oil of turpentine, and coloured with the resin of milfoil.

Qualities. — The odour of this oil, as it is brought to us, is at first powerful, and similar to that of a mixture of cardamoms, oil of turpentine and camphor, but it soon becomes extremely fragrant and agreeable: the taste is pungent, and resembles very much that of camphor. It is limpid, transparent, and generally of a grass-green colour, which was long supposed to be derived from the copper of the flasks; but Mr. Brande says, "none of the samples which I have examined contain copper."[3] When dropped on the surface of pure water, it diffuses itself over it, and very soon completely evaporates, which is a good test of its purity. Its sp. gr. is 914—927: it boils at 343°; it burns rapidly, without leaving any residuum. Like other volatile oils, it is entirely soluble in alcohol, which is not the case when it is adulterated with fixed oil. It is partially soluble in water. It dissolves iodine. Neither nitric nor sulphuric acids act violently upon it. Its formula is $C_{10}H_8 + HO$.

Medical properties and uses. — Cajuputi oil is a highly diffusible stimulant, antispasmodic, and diaphoretic.[4] When taken into the stomach it produces a sensation of heat, fills and quickens the pulse; and, soon afterwards, a copious sweat breaks out. It is efficaciously given in dropsy, chronic rheumatism, palsy, hysteria, flatulent colic, and other spasmodic and nervous affections. It was given in Asiatic cholera in this country in 1832. As a local and

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[1] The natives of the Moluccas macerate the leaves and flowers in fresh oil, and afterwards impregnate the oil with the smoke of benzoin. This preparation they call *minjac money*, or odorated oil, and use it as an unguent for the head. — *Rumphius, Herb. Amboin.* l. c.

[2] *Rumphius.*

[3] *Manual of Pharmacy.*

[4] "Hujus olei binæ guttæ cum cerevisia vel vino propinatæ sudores excitant vehementes, cui fini apta medicamenta India exhibet perpauca." — *Rumphius.*

external stimulant, it is employed, diluted with olive oil, as an embrocation to allay the pain of gout and chronic rheumatism, and to restore vigour to joints after sprains. Largely diluted with olive oil, I have found it extremely serviceable in phlegmasia dolens after the active inflammation has been subdued. When put into a carious tooth, it lulls the pain of toothache: and we have seen much benefit derived from rubbing it on the temples, in defective vision from a weakened state of the eyes. The dose is ♏ij. to ♏vj. on a lump of sugar, or in any bland fluid.

MELISSA. *Spec. Plant. Willd.* iii. 146.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.
G. 1118. *Calyx* dry, nearly flat above: with the upper lip subfastigiate. *Corolla,* upper lip somewhat arched, bifid; lower lip with the middle lobe cordate.
Species 1. Melissa *officinalis.*[1] Officinal or Common Balm. *Med. Bot. 2d edit.* 335. *t.* 119. *Hayne,* vi. 32.
Officinal. MELISSA, *Edin.* Balm leaves.

Syn. Mélisse, Citronelle (*F.*), Gemeine Melisse (*G.*), Citronen kruid (*Dutch*), Meliss (*Swed.*), Hiertensfryd (*Dan.*), Melissa autetschnaia (*Russ.*), Cedronella, Melissa (*I.*), Melissa Balsamina (*S.*).

Balm is a perennial plant, a native of the south of Europe, growing in mountainous situations, and flowering from July to September. It is cultivated in our gardens.[2] The root is fibrous, and sends up annual stems, which rise about two feet high, and are branched, quadrangular, and smooth. The leaves are opposite in pairs, of a bright green colour, ribbed, deeply serrated, and cordate; the lower are on long foot-stalks, and the upper nearly sessile. The flowers, which are in small axillary bunches, forming semi-whorls, stand on slender peduncles, at the base of which are small, oblong, notched hairy bracts. The calyx is tubular and pentangular; the upper lip tridentate; the lower shorter, and cut into two acute teeth. The corolla, which is tubular, of a yellowish white colour, with the upper lip shorter, and notched, and the lower three-cleft, encloses the anthers: the achenia are four, ovate, dry, smooth, and placed at the bottom of the calyx.

For medicinal use, the herb should be cut before it flowers.

Qualities. — The recent plant has the agreeable odour of the lemon, which is lost in drying; and an austere, slightly aromatic taste. In distillation with water, it yields a small portion only of a yellow essential oil, on which its odour depends. The watery infusion tastes rough; reddens slightly litmus paper; and affords with persulphate of iron a deep olive, with nitrate of silver a deep brown, and with acetate of lead a copious greenish-white preci-

[1] Μελισσοφυλλον Dioscoridis, bees being very fond of it.
[2] It was cultivated by Gerarde in 1596.

pitate. It contains a *volatile oil, gum resin, a bitter principle, tannic acid,* and *lignin.* The oil which is the active principle has a sp. gr. 0·973.

Medical properties and uses. — Balm is stimulant, stomachic and diuretic. It was formerly prized as a corroborant, in nervous affections; but it is now used only in infusion, as a diluent in fevers.

MENISPERMUM COCCULUS. See *Cocculus Indicus.*

MENTHA.[1] *Spec. Plant. Willd.* iii. 74.

Cl. 14. *Ord.* 1. Didynamia Gymnospermia. *Nat. ord.* Labiatæ.
G. 1102. *Corolla* not quite equal, four-cleft; the broader segment emarginate. *Stamens* upright, distant.
* *Spiked.*
Sp. 7. M. *viridis.* Spearmint. *Smith* (*spec.* 3.), *Flora Brit.* 612. *Med. Bot. 3d edit.* 338. *t.* 121. *Hayne,* xi. 36.
** *Capitate.*
Sp. 13. M. *Piperita.* Peppermint. *Smith* (*spec.* 4.), *Flora Brit.* 613. *Med. Bot. 3d edit.* 336. *t.* 120. *Eng. Bot.* 461. *Hayne,* xii. 37.
*** *Verticillate.*
Sp. 20. M. *Pulegium.* Pennyroyal. *Smith* (*spec.* 12.), *Flora Brit.* 624. *Med. Bot. 3d edit.* 342. *t.* 122. *Hayne,* xi. 39.

1. MENTHA VIRIDIS.[2]

Officinal. MENTHA VIRIDIS, *Lond. Edin. Dub.* Spearmint. Recent and dried flowering herb, *L.* Herb, *E. D.*

Syn. Baume verte (*F.*), Frauenmünze, Romische münze (*G.*), Grüne munt (*Dutch*), Menta Romana (*I.*), Menta (*S.*).

This is an indigenous, perennial plant, growing in marshy places, and flowering in August. For medicinal purposes it is cultivated. The root is creeping; the stem quadrangular and foliaceous, rising about two feet in height, erect, smooth, and branching. The leaves are opposite, nearly sessile, lanceolate, about two inches and a half long, and an inch broad; of a deep green colour above, paler beneath, pointed, serrated, smooth, and sometimes a little hairy underneath: the flowers are supported on smooth, partial flower-stalks, verticellated, in long, pointed, panicled spikes; furnished with cetaceous, ciliated, lanceolate bracts, longer than the whorls of flowers; the calyx is cylindrical and furrowed, with five nearly regular teeth: the corolla funnel-shaped, tender, smooth, and of a purple colour: the stamens vary in length, with roundish anthers: and the style, which is filiform,

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[1] Μινθη Hippocratis. Hæc species dignoscitur pedicellis semper glaberrimis. — *Smith, Flor. Brit.* 613.

[2] The generic name is stated by Ovid (*Metam.* 10. v. 729.) to be derived from Minthè, a daughter of Cocytus, who was transformed into mint by Proserpine in a fit of jealousy.

with a bifid divaricated stigma, rises from a four-cleft germen: the fruit is four, small, and generally abortive, owing to the viviparous nature of the roots.

For medicinal use, spearmint is generally cut just as the flowers appear; but for obtaining the essential oil, the flowering plant is preferred. It should be cut in very dry weather.

Qualities. — Spearmint has a strong aromatic odour, depending on the presence of a volatile oil, and a warm, slightly bitter taste; neither of which qualities is impaired by drying. Both alcohol and water extract its virtues.

Medical properties and uses. — Spearmint is stomachic and carminative. The infusion is serviceable in allaying sickness and vomiting in a weakened state of the stomach.

Officinal preparations. — *Aqua Mentha viridis*, L. E. D. *Infusum Menthæ viridis*, D. *Oleum Menthæ viridis*, E. D. *Spiritus Menthæ viridis*, L. *Essentia Menthæ viridis*, D.

2. MENTHA PIPERITA.

Officinal. MENTHA PIPERITA, *Lond. Edin. Dub.* Peppermint. Recent and dried flowering herb, *L.* Herb, *E. D.*

Syn. Menthe poivrée (*F.*), Pfeffermünze (*G.*), Peperminte (*Dutch*), Peparmynta (*Swed.*), Pepermynte (*Dan.*), Mista penetschnaia (*Russ.*), Menta piperita (*I.*), Ierba buena de sapor de Pimienta (*S.*), Hortelaä apimentada (*Port.*).

Peppermint is an indigenous, perennial plant, growing in moist places, and flowering in August and September. It is generally cultivated for medicinal use, particularly about Mitcham in Surrey[1], whence the London market is chiefly supplied. There are three varieties of peppermint, the first of which is the officinal plant. The root is creeping: the stem quadrangular and channelled, nearly upright, and about two feet high, branching, purplish, and rather hairy, with the hairs bent backwards: the leaves are of a dark green colour, opposite, petiolate, ovate, rather pointed, serrated, the upper side smoother and less pubescent than the under, which is paler, with white and purple veins: the flowers are in terminal spikes, solitary, almost capitate, interrupted beneath, with the lower whorl more remote, and on a foot-stalk: the bracts are lanceolate and ciliated; the calyx is furrowed, tender, studded with glandular points; the base entirely naked, very smooth, and five-cleft, with the teeth of a blackish purple colour, and ciliated: the corolla is purple; and conceals within its tube the anthers, which are on short filaments; the germen is four-cleft, with a filiform style, longer than the corolla, and furnished with a bifid stigma.

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[1] Considerably more than one hundred acres of this herb are grown in the parish of Mitcham; but the greater part of the peppermint is made into a *liqueur*, which is sold as a dram in London. — *Stevenson's Survey*, pp. 377, 378.

Dr. Smith supposes that this plant was discovered by Doctor Eales; and on examining the Linnæan Herbarium, now in his possession, he found that the Mentha *piperita*, described by Linnæus, was not our officinal plant, but merely a variety of the M. *hirsuta*, with the odour of peppermint. It was, however, first described by Petiver. "The cultivators of the plant observe, that, to keep up its quality, the roots must be transplanted every three years; otherwise it degenerates into the flavour of spearmint."[1] If the plant be cut in wet weather, it changes to black, and is little worth.

Qualities. — The odour of both the recent and dried plant is penetrating and grateful, in some degree resembling camphor; and the taste pungent, warm, glowing, and bitterish, followed by a sensation of coldness, especially when air is drawn into the mouth; these qualities depend on a volatile oil. Its infusion strikes a green with salts of iron. The oil can be obtained separate by distillation in water; it is of a yellowish colour: sp. gr. is 0·902. One pound of the recent plant should yield from f ʒ j. to f ℥ ss. of the oil.

Medical properties and uses.—Peppermint is tonic, antispasmodic, and carminative. It is chiefly used to allay nausea and griping, to relieve flatulent colic, and in hysteria; or, as a vehicle, to cover the nauseous taste of other medicines; but to many palates it is extremely disagreeable. It may be given under the form of watery infusion; but the distilled water and the volatile oil are generally preferred.

Officinal preparations. — *Aqua Menthæ Piperitæ*, L. E. D. *Oleum Menthæ Piperitæ*, E. D. *Spiritus Menthæ Piperitæ*, L. *Spiritus Menthæ*, E. *Essentia Menthæ Piperitæ*, D.

3. MENTHA PULEGIUM.[2]

Officinal. PULEGIUM, *Lond. Edin.* MENTHA PULEGIUM, *Dub.* Pennyroyal. Recent and dried flowering herb, *L.*

Syn. Mentha-pouliot (*F.*), Polymûnze, Poley (*G. Dutch, Dan.*), Puleja (*Swed.*), Poley (*Pol.*), Polei; Mista serletschnaia (*Russ.*), Puleggio (*I.*), Poleo (*S.*), Poejos (*Port.*).

This is an indigenous, perennial plant, growing on heaths and in moist meadows, and flowering in September. Like the other mints, it is cultivated for medicinal purposes; and becomes more luxuriant and erect by cultivation. The stem is obtusely quadrangular, trailing, branching, and somewhat hairy; the leaves are petiolate, small, obtuse, bluntly serrated, and in a small degree hairy underneath; the flowers, which are bisexual and small, are supported on stalks covered with short thick hairs in dense, sessile

[1] *Linnæan Transactions*, v. 176.

[2] Γλήχων Dioscoridis.

whorls, many-flowered, and without bracts: the calyx is of a purplish green colour, tender, furrowed, and covered with thick short hairs: five-cleft, with the teeth pointed, unequal, and ciliated: the corolla is twice the length of the calyx, purple, four-cleft, with the base white and externally villous: the stamens are erect, and longer than the corolla; and the germen similar to that of the former species.

Qualities.—The odour is similar to that of spearmint, but less fragrant; the taste aromatic and pungent, with a slight flavour of camphor, followed by a sensation of coldness. These qualities reside in a volatile oil, which rises in distillation with water.[1] The infusion of Pennyroyal contains *tannic acid,* and strikes a deep-green colour with the salts of iron.

Medical properties and uses.—Pennyroyal was formerly regarded as emmenagogue, expectorant, and diaphoretic; and was in repute for promoting the uterine evacuation, and relieving hysteria, hooping-cough, and asthma; but it is now justly considered of no value, and seldom used in regular practice.

Officinal preparations.—*Aqua Pulegii,* L. E. D. *Oleum Pulegii,* E. D. *Spiritus Pulegii,* L. *Essentia Menthæ Pulegii,* D.

MENTHÆ VIRIDIS OLEUM, *L.* See Part III.

MENTHÆ PIPERITÆ OLEUM, *L.* See Part III.

MENTHÆ PALEGII OLEUM, *L.* See Part III.

MENYANTHES. *Spec. Plant. Willd.* iii. 810.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Gentianaceæ.
G. 229. *Corolla* hirsute. *Stigma* cloven. *Capsule* one-celled.
Sp. 4. M. *trifoliata.*[2] Buckbean. *Med. Bot. 3d edit. t.* 97. *Smith, Flor. Brit.* 225. *Eng. Bot.* 405. *Bigelow, Amer. Med. Bot.* iii. 55. *Hayne,* iii. 14.
Officinal. MENYANTHES, *Edin.* The leaves of Buckbean, or Menyanthes Trifoliata.

Syn. Menyanthe (*F.*), Bitterklee, Zottenblume (*G.*), Water-drieblad (*Dutch*), Vandk lever (*Dan.*), Vattenklöfver (*Swed.*), Troylist (*Pol.*), Bachta trilistnaia (*Russ.*), Trifolio fibrino, Meniante (*I.*), Menyanthes de tres en rama (*S.*), Trevo d'agua (*Port.*).

This is one of the most beautiful of our indigenous plants; found also in the north of Europe, in North America, and Cash-

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[1] "1 cwt. of fresh pennyroyal affords an average produce of 1 lb. of volatile oil."—*Brande's Manual,* p. 146.
[2] Μήνανθος Theophrasti.

meer.[1] It is a perennial not uncommon in watery situations, in a black boggy soil, flowering in June and July. The root is long, round, fibrous, and of a black colour; the stems are spreading, branched, and clothed with sheathing foot-stalks, each of which supports a ternate leaf, formed of three obovate smooth, bluntly, toothed leaflets of a beautiful green on the upper surface, and pale beneath: the flowerstalk, which springs from within the sheath of a leaf, is longer than the leaves, erect, smooth, round, bearing a thyrsus of about ten flowers, accompanied by small ovate entire bracts: the calyx is obtusely five-toothed: the corolla a funnel-shaped petal, cleft into five deep segments, which are white, tipped with rose-colour, and closed within with long, fleshy, shaggy fibres on their upper side; the anthers are sagittate, and of a red colour: the germen round; and the stigma cloven and notched, on a slender style twice the length of the stamens.

Qualities.—The leaves of buckbean have a faint, disagreeable odour, and an intensely bitter, nauseous taste, which is extracted by infusion with water. The infusion contains much *tannic acid*; and, according to Tromsdorff, *bitter extractive, albumen, brown gum, fecula, malic acid, acetate of potassa,* and a *peculiar matter* which is thrown down by tannic acid.[2] The bitter principle is probably identical, or closely allied, to that contained in Gentiana lutea.

Medical properties and uses.—Buckbean is tonic, anti-periodic, diuretic, and purgative. It has been used with seeming benefit in remittent and intermittent fevers, rheumatism, arthritic affections, and in cachectic and cutaneous diseases. In large doses it is apt to excite vomiting. The dose of the dried leaves powdered is from ℈j. to ʒj.; or of an infusion made with ℥ss. of the dried leaves and boiling water O ss., from f ℥j. to f ℥jss. may be taken three or four times a day. It is advisable to unite some aromatic with either of these forms.

MEZEREUM. See *Daphne.*

MOMORDICA. *Spec. Plant. Willd.* iv. 601.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Cucurbitaceæ.
G. 1739. *Male. Calyx* five-cleft. *Corolla* five-parted. *Filaments* five.
——— *Female. Calyx* five-cleft. *Corolla* five-parted. *Style* trifid. *Gourd* opening elastically.
Species 13. M. *Elaterium.*[3] Ecbalium officinarum. Ecbalium agreste. Squirting Cucumber. *Med. Bot. 2d edit. t.* 72. *Hayne,* viii. 45.

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[1] Dr. Falconer found it in a lake in Cashmeer, near Mussourie.—*Proceedings of the Linn. Soc.* Feb. 1839.
[2] *Ann. de Chim.* lxxii. 191.
[3] Ελατηριον Dioscoridis. Σικυς αγριος antiquorum.

Officinal. ECBALIUM OFFICINARUM, FRUCTUS RECENS TANTUM NON MATURUS, *Lond.* MOMORDICA ELATERIUM, *Edin.* ECBALIUM AGRESTE, *Dub.* Fresh fruit not yet ripe, *L.* Feculence from juice of fruit, *E. D.*

Syn. Concombre sauvage (*F.*), Esselsgurken, Springgurke (*G.*), Ezelskomkommers (*Dutch*), Cocomero salvatico, C. asinino (*I.*), Cohombrillo amargo (*S.*), Pepino de San Gregorio (*Port.*).

This species of momordica is a perennial native of Greece and the south of Europe, flowering in June and July. It is cultivated in England[1], and flowers in July; but it does not survive the severity of our winters. The root is large and fleshy, sending forth several thick, rough, trailing stems, which branch and extend three or four feet every way: the leaves are on long petioles, large, rough, of a greyish green colour, and cordate: the flowers are axillary, similar in appearance to those of the common cucumber, but smaller, of a pale yellow colour, with a greenish base: the male flowers stand on short pedicels, but the females sit on the germen, which is inferior: the fruit into which it swells has the appearance of a small oval cucumber of a greyish colour, and covered with soft spines. When fully ripe it quits the footstalk, and casts out the seed and juice with great force, and to a considerable distance, through the hole in the base where the footstalk is inserted.

For medicinal use the fruit is gathered in September, just before it is ripe: it should be then sprinkled with water; each cucumber cut through longitudinally, thrown upon a sieve, and the clear juice allowed to run from it without pressure. The juice soon becomes turbid, and after standing a few hours a sediment is formed, from which the clear fluid should be decanted. This sediment is *Elaterium:* it should be carefully dried by being spread on fine linen, and exposed to a warm dry air, in the shade. The juice is also obtained by the expression of the fruit; and being then inspissated, and dried in a stove, forms much of the elaterium of the shops: but for procuring fine elaterium no pressure should be employed. Forty of the pepos yield only six grains of elaterium. A dark-coloured elaterium is brought from Germany, and a paler from Malta, but both are inferior to English elaterium.

Qualities.—Elaterium is of a whitish-green, grey colour, light, pulverulent, inflammable, nearly inodorous, and impressing a slightly bitter taste. It yields a peculiar principle, to which Dr. Paris gave the name of *elatin,* and on which the active properties of the fecula were supposed to depend: but Mr. Hennel and Mr. Morries ascertained that the elatin of Dr. Paris is a compound of the active principle of the elaterium, which Mr. Morries has named *elaterin,* and chlorophylle. *Elaterin* crystallizes in colourless, microscopic,

[1] It was cultivated by Gerarde in 1596. It grows abundantly round Constantinople.

rhombic prisms, silky, bitter and styptic to the taste, insoluble in water, but soluble in alcohol; less so in ether; soluble also in fixed oils: insoluble in alkalies, but sparingly soluble in diluted acids. Mr. Hennel procured 44 per cent. of elaterin; Mr. Morries 26 per cent. from good British elaterium: 15 from the worst: but only 5 or 6 from French elaterium (see *Extractum Elaterii* among the preparations). The formula of elaterin is $C_6\ H_{12}\ O_5$. Elaterium is often of inferior quality from pressure being employed, and the whole juice evaporated so as to form an extract. The foreign elaterium, which is brought chiefly from Malta, is much weaker than the British.

Medical properties and uses.— This fruit is a very violent hydragogue cathartic, operating chiefly on the intestinal exhalants. It was much employed by the ancients, who regarded every part of the plant as purgative; but Dr. Clutterbuck has demonstrated that this is an error.[1] It is the juice, which is lodged in the centre of the fruit, directly around the seeds, which is the active part. It is also probable that the term elaterium was given by the ancients to very different substances, and Hippocrates applied it to any violent purgative. Dioscorides extolled the fruit as highly efficacious in melancholic and maniacal attacks: it is still used by the Turks in jaundice. It is frequently prescribed, with the best effects, in dropsies; and, in combination with calomel, it proves highly efficacious; but, when incautiously given, it may bring on a dangerous hypercatharsis. It is a curious fact, that the activity of elaterium does not prevent the influence of calomel from being as soon displayed on the glandular system as when it is given alone. The dose of good elaterium is from one-tenth to one-fourth of a grain, repeated once in eight hours.

Officinal preparations. — *Extractum Elaterii,* L. E. *Elaterium,* D.

MORI SUCCUS. See *Morus.*

MORPHIÆ ACETAS, *L.* See Part III.

MORPHIÆ HYDROCHLORAS, *L.* See Part III.

MORRHUA VULGARIS, *vel* GADUS MORRHUA. The Common Cod-fish.

GADUS. *Class* Pisces. *Order* Jugulares, *Linn.* Malacopterygii Subbranchiati. Family Gadidæ, *Cuvier.*

Gen. Ch. Recognised by the ventrals attached under the throat, and attenuated to a point.

Gadus Morrhua, Linn. *Syst. Nat. ed. Gmelin,* i. p. 1162. Cuvier, *Règne animal,* 212. Bloch, *Ichthylogie,* pl. lxiv. *Morrhua vulgaris,* Storer. *Synops. of Fishes of N. America,* p. 216.

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[1] *Lond. Med. Repository,* xii. 67.

The *common cod* is usually between two and three feet long, with brown or yellowish spots on the back; the body is moderately elongated and somewhat compressed, and covered with soft, rather small, scales, of which the head is destitute. Of the fins, which are soft, there are three on the back, two anal and a distinct caudal; and the fin under the throat is narrow and pointed. The jaws are furnished with pointed irregular teeth, in several ranks. The gills are large, with seven rays. This species of cod inhabits the Northern Atlantic, and is especially abundant on the banks of Newfoundland, where it finds food adapted for its wants.

Besides the common cod, several other species of Gadus, frequenting the seas of Northern Europe and America, contribute to furnish the cod-liver oil of commerce. Among these De Jongh mentions *Gadus Callarias* or *Dorsch* (*Morrhua Americana* of Storer), *Gadus Carbonarius* or *Coal fish*, and *G. Pollachius*, or *Pollock*, as affording the oil on the coast of Norway; while, from information obtained by Professor Procter, there is reason to believe that on our own coast (American), in addition to the Pollock above mentioned, it is obtained also from the *Hake* (*G. Merluccius*) and the *Haddock* (*G. Æglifinus.*)[1]

Officinal. MORRHUÆ OLEUM, *Lond. Dub.* The oil prepared from the liver of the Gadus Morrhua, Morrhua vulgaris, or common cod.

Syn. Oleum Jecoris Aselli; Huille da Morue (*F.*), Stockfischleberthran (*G.*).

This oil was at one time prepared by exposing the livers placed upon a sieve to the action of the air and sun; during the decomposition of the parenchama of the livers, the oil became separated, and passed through the sieve into a vessel beneath. Other and improved methods have been since employed: upon the American coasts, the livers are put into a boiler with water, heated until they are broken up into a mass, and then thrown upon a strainer placed on a cask; the liquid passing through soon separates into two parts, the upper, lighter one, consisting of the oil; this is decanted and afterwards strained. At present, both in this country and in America, an improvement has taken place in the process. The livers are simply heated in shallow vessels by the aid of steam applied externally; the oil, together with water, thus slowly separates from the livers, and is afterwards strained.

Qualities.—Cod-liver oil varies very much in its appearance; sometimes it is of a very dark brown colour, at other times almost colourless; and between these extremes oils of every shade may be found. They are divided by De Jongh into three varieties,—brown, pale-brown, and pale; they differ from each other in no very essential characters, except colour, odour, and taste; and this difference is due to the freshness of the livers and the mode em-

[1] From *United States Dispensatory* (Wood and Bache).

ployed in preparing the oil. Cod-liver oil has been frequently analysed, especially by De Jongh. It consists chiefly of *oleine* and *margarine,* thus resembling other animal and vegetable oils; but in addition to these, cod-liver oil contains certain small amounts of principles derived from the proper secretion of the liver, together with traces of *iodine, bromine,* &c. The following table shows the results obtained by De Jongh from an analysis of the three varieties of Oil above alluded to. One hundred parts of cod-liver oil contain —

	Brown.	Light Brown.	Pale.
Oleic acid (with gaduine[1] and two peculiar bodies) -	69·78500	71·75700	74·03300
Margaric acid - - - -	16·14500	15·42100	11·75700
Glycerine - - - -	9·71100	9·07300	10·17700
Butyric acid - - - -	0·15875	- -	0·07436
Acetic acid - - - -	0·12506	- -	0·04571
Fellinic and cholic acids with some oleine, margarine, and bilefulvine - - -	0·29900	0·06200	0·04300
Bilefulvine and bilifellinic acid, and two peculiar substances	0·87600	0·44500	0·26800
A peculiar substance soluble in alcohol of 30 degrees -	0·03800	0·01300	0·00600
Peculiar substance, insoluble in water, alcohol, and ether	0·00500	0·00200	0·00100
Iodine - - - - -	0·02950	0·04060	0·03740
Chlorine, with some bromine -	0·08400	0·15880	0·14880
Phosphoric acid - - -	0·05365	0·07890	0·09135
Sulphuric acid - - - -	0·01010	0·08595	0·07100
Phosphorus - - - -	0·00754	0·01136	0·02125
Lime - - - - -	0·08170	0·16780	0·15150
Magnesia - - - -	0·00380	0·01230	0·00880
Soda - - - - -	0·01790	0·06810	0·05540
Iron - - - - -	a trace.		
Loss - - - - -	2·56900	2·60319	3·00943
	100·00000	100·00000	100·00000

Cod-liver oil is often adulterated with other fish-liver oils, and also with fixed oils not derived from livers or from fish. The adulteration with other fish-liver oils is probably of little consequence, as there is reason to believe that their action on the system is similar to that of cod-liver oil: the adulteration with other oils is of more importance.

[1] *Gaduine,* when separated, occurs as a dark brown substance, devoid of odour or taste, insoluble in water, but soluble in alcohol and ether; made blood red with sulphuric acid, and is precipitated from its solution by water: it is decolourised by chlorine. Formula $C_{35} H_{23} O_5$. It does not appear to give to the oil any of its peculiar properties.

Pure cod-liver oil gives rise to a beautiful lake-colour when some sulphuric acid is dropped into a thin layer of it; other fish-liver oils will do the same, as that from the ling, haddock, whiting, &c.: the other oils, however, do not give this test, but become brown. When kept for some time, especially if exposed to air, cod-liver oil is very apt to become rancid: this takes place more readily if it has not been perfectly freed from water.

Medical properties and uses. — For very many years cod-liver oil had enjoyed considerable popular reputation, especially in Holland and North Germany, in the treatment of chronic rheumatic and scrofulous diseases; but, on account of the disgusting odour and taste of the oil then employed, it did not come into general use. Recently, however, from the trials of this remedy by Dr. Hughes Bennett, and the publication of his treatise in 1841, and from the subsequent experience and writings of many physicians and surgeons, its value has been established, and it has now become one of the most important remedies in the list of the Materia Medica: the paper of Dr. C. J. B. Williams, published in the first volume of the London Journal of Medicine, has greatly tended to extend its reputation, especially in the treatment of phthisis. At the present time the diseases for which this remedy is generally administered are, — different stages of tubercular phthisis, chronic inflammatory affections, especially those of a tubercular and scrofulous character; chronic rheumatism and gout, chronic diseases of the skin and bones, and, in fact, in certain stages of almost every disease, especially where there is an evident want of nutrition, as in diabetes, &c. It appears to act very favourably in mesenteric and other glandular affections in children.

The mode in which cod-liver oil acts upon the animal economy is at present unknown, nor has it yet been fully established whether its efficacy depends upon the oleaginous principles themselves, or upon certain other ingredients contained in this oil. That it does not act simply as a nutritive agent, or as a means of introducing fat into the system, is evident from the fact, that patients will not unfrequently gain in weight from four to six times the amount of oil administered during the time; and moreover in those cases of phthisis, for example, where it is advantageously administered, it not only causes the patient to increase in weight, but at the same time decreases or checks altogether the hectic symptoms under which he was labouring. Some suppose that its efficacy is due to the traces of iodine and bromine which are found in the oil. In opposition to this view it may be stated, that the influence is very different from that produced by either one or other of these elements, and not unfrequently it acts most beneficially when iodine has failed to relieve. It seems probable that the value of cod-liver oil depends upon its being very readily assimilated; and this quality, which it appears to possess beyond most other oils,

may be due to its containing biliary principles. Cod-liver oil is usually given in doses varying from ʒ j. to ℥ j., generally floating on some aromatic fluid. Some patients prefer taking it in milk: where the digestive powers are weak, a bitter infusion, with or without some mineral acid, has appeared to be of service: frequently it will sit easy on the stomach if taken at or soon after a meal, in cases where it would otherwise produce nausea. For children the dose may be from ʒ ss. to ʒ ij. according to the age; and it is usually well borne by these little subjects, to whom generally it is not unpalatable. The attempt to increase the dose much beyond a table-spoonful twice or thrice a day in the adult has very seldom been attended with advantage; and not unfrequently it has caused disturbance in the system, which has rendered its suspension necessary. Perseverance in the use of small doses for a lengthened period, has proved the most successful plan of treatment.

MORUS. *Spec. Plant. Willd.* iv. 368.

Cl. 21. *Ord.* 4. Monœcia Tetrandria. *Nat. ord.* Urticaceæ.
G. 1664. *Male. Calyx* four-parted. *Corolla* none.
——— *Female. Calyx* four-leafed. *Corolla* none. *Calyx* becoming a berry. *Seed* one.
Species 5. M. *nigra.*[1] Common Mulberry-tree. *Med. Bot. 2d edit.* 712. *t.* 243.
Officinal. MORI SUCCUS, *Lond.* Mulberry juice.

Syn. Murier noir (*F.*), Schwarze Maulbeeren (*G.*), Morone o Gelso (*I.*), Moras (*S.*).

This species of mulberry is a native of Persia and China, whence it was brought to Italy, and gradually spread over Europe. It is now abundantly cultivated in this country, flowering in May and June, and ripening its fruit in September. The tree, which seldom exceeds thirty feet in height, is covered with a brownish grey bark: the leaves are numerous, on short footstalks, cordate, serrated, veined, about three inches long and nearly as broad; rough on the upper surface, which is of a deep green colour, and covered with minute warts; and paler and villous underneath. The male flowers, which are on the same tree as the female, are in close roundish catkins, composed of caducous florets, which consist of four concave, oval, erect, calycinal leaves, enclosing four filaments bearing simple anthers; the female flowers contain a roundish germen, crowned with two divaricated styles furnished with simple stigmas, enclosed in a calyx of four ovate, concave, erect leaves; which, after flowering, swell, become succulent and coloured, investing the seed; and, many of them being crowded together on one peduncle, form a spurious compound berry, that has the appearance of a real, succulent berry, composed of a number of smaller berries[2]; constituting what botanists call a *sororis.*

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[1] *Συνάμινος* Theophrasti.

[2] It is a curious fact that two mulberry-trees growing near one another bear gene-

Qualities.—Mulberries are inodorous, have a sweet, acidulous taste, and abound with a deep blood-red juice. Hermbstadt found that their acidulous quality depends on the presence of tartaric acid, and I ascertained that they contain also *jelly, mucus, sugar,* and *lignin.*

Medical properties and uses.— This fruit is cooling and laxative; and, when not too ripe, allays thirst and proves exceedingly grateful in febrile diseases. It is seldom, however, used medicinally. When eaten too freely, as an article of food, it is apt to occasion diarrhœa. Its colouring matter is perceptible in the urine.

Officinal preparation. — *Syrupus Mori,* L.

MOSCHUS. *Syst. Nat. Gmelin,* i. 172.

D. 1. Mammalia. *Ord.* 7. Ruminantia. *Cuvier.*
G. 28. *Horns* none. *Fore-teeth* eight in the lower jaw. *Tusks* one on each side in the upper jaw, projecting out of the mouth.
Species. M. *Moschiferus.* The Musk Deer. *Pennant, Quadr.* 56. *t.* 10. *f.* 1.
Officinal. MOSCHUS, *Lond. Edin. Dub.* Musk. Inspissated secretion found in the follicle of the prepuce of the Musk Deer.

Syn. Musc (*F.*), Bisam (*G.*), Muskus (*Dutch*), Mysk (*Swed.*), Desmer (*Dan.*), Kabarga (*Russ.*). Muschio (*I.*), Almizcle (*S.*), Almiscar (*Port.*), Mishk (*Arab. H.*), Castorie (*Tam.*), Jebat (*Malay*), Mesk (*Pers.*), Rutta Oorrola (*Cyng.*), Ziakoo (*Japanese*).

This animal, from which the musk of commerce is obtained, is an inhabitant of the alpine mountains of the east of Asia, particularly of the Himālāyā mountains, which divide Thibet from India; where it is known by the name of *custeru*. It is also found in China. It is a solitary animal, living among the rocks, and frequenting the highest tops of the snowy peaks; very timid, and difficult to be taken. The length of the full-grown animal scarcely ever exceeds three feet, and in its general aspect it resembles the deer; the eyes are black and full; and, projecting from the upper jaw, on each side a tusk hangs pointing downwards over the lower jaw: the fleece is coarser than that of the stag, but very light and soft, and varying in colour at different seasons of the year and different periods of life; chiefly from brown to nearly black, hoary underneath, and sometimes, but rarely, whitish. The tail is very short. Between the umbilicus and the prepuce, in the male, is an oval bag, broader at the anterior than the posterior part, flat on one side, where it is in contact with the belly of the animal, and convex on the other, about two inches long and one and a half inch broad, and three-fourths of an inch in depth, with a very small orifice or aperture placed in the median line, and

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rally more fruit, and that of a finer quality, than is produced by solitary trees. This is supposed to be owing to the male flowers in one of the trees being more effective than those of the other.

beset with short hairs. This is the musk bag: it is lined with a smooth membrane, which forms irregular folds, and incomplete partitions in the sac. The musk is probably secreted by this membrane. The sac has a muscular coat, the fibres of which surround the sac, and by their contraction compress it. The musk-bag is empty in the young animal; but in the adult it contains from ʒij. to ʒvj. of musk, in a liquid state. The animal often expresses part of the contents of the bag, when it becomes too full, by rubbing itself against stones; and the matter thus ejected is said to be a purer musk than that which is brought to this country. The bag is generally cut from the animal while it is yet alive; and an idea prevails that the animal must be caught alive in order to obtain the musk, which is said to be absorbed and lost if the deer be shot. As soon as the bag is cut away, a small hollow reed is inserted into it, that the musk may not suffer, which it would be apt to do from want of air; and the whole is tied round with a sinew of the animal.[1]

Musk is imported into England from China in the follicles, packed in catties, and is termed *Tonquin musk*, *Thibet musk*, or *China musk*. Each catty contains about 25 pods, each wrapped in paper, covered with rude Chinese characters. The hair on the Tonquin musk pod is brownish-yellow, arranged in a concentric manner round the orifice of the sac. The musk in the sac is granular, of a reddish-brown colour. An inferior kind is brought from Russia, called *Siberian*, *Russian*, or *Kabardine* musk. The sacs are longer and larger than those of the Chinese musk; and are covered on the convex side with flattish, coarse white hairs. Musk should always be bought in the natural follicle, or the *pod*, as it is denominated in mercantile language. It is about the size of a pigeon's egg, covered on one side with fawn-coloured hair, if *Chinese* musk, or white hair if *Kabardine* musk; and, on the other side, it is naked. The sac from a vigorous adult deer contains about ʒvi. of musk; but as the animal increases in age the quantity lessens. The musk itself is in grains concreted together, dry, yet slightly unctuous, and free from grittiness when moistened and rubbed between the fingers, or chewed. The average quantity of musk contained in each bag appears to be about two drachms and two-thirds (Pereira).

As musk is a very high-priced article, it is often adulterated. When this is the case, the bag, which should not have any appearance of having been opened, seems, if narrowly examined, slit or punctured in several places, through which sand, lead, and other heavy matters are inserted. The musk is sometimes nearly all abstracted, and a mixture of dried blood and asphaltum introduced into the bag; or both the bag and the musk are artificial, and only

[1] *Journ. of a Tour in the Himālāyā Mountains*, by J. B. Fraser, 4to. Lond. 1820, p. 352.

scented with real musk. The blood of the animal itself is often injected into the bag of musk, while both are warm, and they then unite. The first of these adulterations is easily detected. The presence of blood may be suspected, if the musk, when held over the flame of a candle on a thin spatula, emits, as it inflames, a fœtid smoke, or by its watery solution giving a precipitate with bichloride of mercury from the presence of the albumen of the blood: and asphaltum is discovered by its melting and running before it inflames, if heated on a spatula: whereas real musk inflames without running, and is converted into charcoal.[1] The artificial bags are known by the inner membrane, which lines the real musk bags, being deficient, and by the hairy portion of the pod being stitched to the smooth part; and the hair not assuming the concentric circles of the real musk bag. Dr. Neligan states that spurious musk bags can be detected by the microscopic character of the hairs with which they are covered: the hairs of the true musk bag are furnished internally with distinct colour cells, while none can be perceived in those found on the spurious pods: this character, however, is said not to be confined to the hairs of the true musk pods, and to have been detected on those of the false. Musk which is pale or wholly black, of a faint odour, or gritty or moist, should be rejected.

Qualities. — The odour of musk is aromatic, but peculiar, extremely powerful and durable[2]; the taste is bitterish, acrid, and heavy; and the colour a deep reddish-brown. It burns with a white flame, and leaves a light spongy charcoal. Trituration with potassa developes ammonia. Boiling water dissolves about 80 parts, alcohol only 50, sulphuric ether nearly the whole. The watery *infusion* has a yellowish-brown colour, a bitterish taste, and the strong odour of the musk; and reddens infusion of litmus. Solutions of bichloride of mercury do not precipitate true musk infusion: but it is precipitated by infusion of galls, sulphate of iron, and acetate of lead: it is also precipitated by infusion of yellow Cinchona bark. Solution of nitrate of silver throws down a whitish precipitate, which, on exposure to the light, changes to a livid blue: and nitrate of mercury produces a brownish precipitate. The *alcoholic tincture* is of a reddish-brown colour, transparent, with a slight odour of the musk: water renders it milky, and gives out the strong musk odour: with the other tests it presents the same results as the watery infusion. The *ethereal tincture* has a deep brown colour; and, when evaporated on the surface of water,

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[1] The formation of ammonia, when rubbed with potassa, has also been mentioned as a test of the presence of blood; but the fixed alkalies have developed ammonia in the best specimens of musk we have ever seen.

[2] " A clean cork, which stopped a phial in which there was musk, which it seemed never to have touched, in 1712, smelled of musk more than twenty years after." — *Alston's Let. on Mat. Med.* vol. ii. p. 542. Fée says that one part of musk will communicate its odour to 3000 parts of inodorous powder.

deposits a brown, tenacious, nearly insipid resin, and renders the water milky. The resinous matter has the musk odour in perfection; while the substance which occasions the turbidness of the water possesses the properties of extractive. Musk appears to contain a *volatile matter*, a *peculiar fixed acid*, *stearine* and *oleine*, *cholesterine*, *bitter resin* combined with the *volatile oil*, *osmazome*, *various salts*, chiefly *phosphates*, with a trace of *iron* and *impurities*.[1] According to Thiemann, it contains *carbonate of ammonia* 10, *wax* 9, *resin* 1, *gluten* 60, *albumen* 30, *carbonate of potassa* 1, *hydrochlorate of soda* 3, *carbonate of lime* 4[2]: but besides these, Guibourt and Blondeau found *eläine*, *stearine*, *cholesterine*, *gelatin*, and *fibrine*.[3]

Medical properties and uses. — Musk is stimulant and antispasmodic. Aëtius is the first writer who mentions it as a medicine; but it did not come into general use in this country till the beginning of the sixteenth century. It raises the pulse without much augmenting the heat of the body, and has a remarkable power of resolving spasm, and increasing the energy of the brain and nerves. Hence it is very efficaciously given in typhoid fevers, when low delirium, subsultus tendinum, and hiccough supervene; and in combination with ammonia to arrest the progress of gangrene. Its beneficial effects in chorea[4], and in many spasmodic diseases, are well established; and Cullen says, he can vouch for its powers in retrocedent gout, which in many instances he had seen suddenly relieved by large doses of musk.[5] It checks the vomiting in cholera, at the same time that it allays the tormina of the intestines. In epilepsy I have seen more benefit derived from musk in combination with calomel than from any other remedy; and I am inclined to attribute much of the disappointment which others have experienced, either to the remedy not having been genuine, or to the smallness of the dose. To obtain the full benefit of musk in this disease, the dose must be much larger than that which is usually given; it should be repeated at shorter intervals, and its use longer continued. In an old confirmed case, in which three or four fits were experienced daily, musk, given to the extent of ʒ ss. four times a day, reduced the number of fits to one in three months. Upon the whole, I agree with Cullen, "that musk is one of the most powerful antispasmodics we are acquainted with[6];" and I regret that the high price of the drug necessarily limits very much its employment.

As a local remedy, musk is said to be useful in atonic deafness, when inserted into the ear with cotton; and it is recommended in

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[1] *Gmelin, Handb. d. Chim.* ii. 1449. [2] *Berl. Jahrb.* 1803, § 100.
[3] *Journ. de Pharm.* vi. 105.
[4] *Case of Chorea in an aged Person, cured by Musk*, by W. G. Maton, M.D. F.R.S. — *Trans. of the Coll. of Phys.* Lond. vol. v. p. 188.
[5] *Mat. Med.* ii. 381. [6] *Mat. Med.* l. c. 380.

the form of enema in the convulsions of children arising from the irritation of dentition.

Musk is best given in substance, in the form of bolus. The dose may be from grs. vj. to ʒss. repeated at intervals of six or eight hours. Its best preparation is the tincture.

MUCUNA. *De Candolle.*

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.
G. 1349. At the base of the standard, two oblong parallel scales, compressing the wings underneath.
* *Twining.*
Species 16. M. *pruriens.* Cowhage. (Dolichos *pruriens.*) *Med. Bot. 3d edit.* 422. *t.* 153. *Chamberlaine's Practical Treatise on the Efficacy of Stizolobium or Cowhage. Bot. Reg.* 1838, 18.
Officinal. MUCUNA, *Lond. Edin. Dub.* The hairs of the pod, or fruit of Mucuna pruriens.

Syn. Puis à gratter (*F.*), Kuhkrätze (*G.*), Dolico pizzicaule (*I.*), Kiwách (*H.*), Poonay kalie (*Tam.*), Capicach'hu (*San.*).

This is a perennial climbing plant, a native of America, and the East and West Indies. In Bengal, where is it named *Cadjuct*, it flowers in the cool months from September to March. The root is fibrous: the stem herbaceous, cylindrical, voluble, climbing, and branching; with ternate leaves, on footstalks from six to fourteen inches long, given off alternately at the distance of a foot from each other. The central leaflet is rhomboidal, the two lateral ones oblique, and all of them smooth on the upper surface, and hairy beneath. The flowers are papilionaceous, of a blood colour, peduncled, in pendulous solitary spikes, which hang from the axillæ of the leaves. The fruit is a coriaceous pod, about four or five inches long, curved like the letter *f*, thickly covered with bristly, short brown hairs; and containing three or five oval compressed seeds.

The pods we receive are brought from the West Indies. If incautiously touched, the spiculæ with which they are beset separate easily, and sticking in the fingers occasion the most intolerable itching.

Medical properties and uses. — The spiculæ of Mucuna pods operate as a mechanical anthelmintic. They have been found particularly useful in expelling the round worm, *lumbricus teres;* the spiculæ irritating, and aiding its expulsion, by wounding it without affecting the intestines. The best mode of preparing the remedy is to dip the pods in syrup or molasses, and then with a knife to scrape off the hairs along with the syrup. When the mixture attains the thickness of honey it is sufficiently impregnated with the hairs, and is fit for use.

The dose of this mixture, for a child of three or four years old,

is a tea-spoonful given in the morning for three days, and then followed by a brisk cathartic.

The spiculæ of the Mucuna rubbed in the skin is an excellent excitant in cases of poisoning by opium or other powerful narcotics.

MYRISTICA. *Spec. Plant. Willd.* iv. 869.

Cl. 22. *Ord.* 13. Diœcia Monadelphia. *Nat. ord.* Myristicacæ.

G. 1851. *Male. Calyx* urceolate, trifid. *Corolla* none. *Filament* monadelphous. *Anthers* six or ten united.

——— *Female. Calyx* urceolate, trifid, deciduous. *Corolla* none. *Style* none. *Stigma* two-lobed. *Drupe*, a nut involved in a fleshy arillus (*Mace*), with one seed.[1]

Species 1. M. *officinalis*, vel *Moschata.* The Nutmeg-tree. *Med. Bot.* 2*d edit.* 698. *t.* 238. *Rumphius, Herb. Amboin.* ii. *lib.* 11. *c.* 5. *t.* 4. *Hayne*, ix. xii.

Officinal. MYRISTICA, *Lond. Edin. Dub.* The Kernel of the fruit. Nutmeg. Oleum Myristicæ; Oil of Nutmeg (expressed), *L.* (Essential and expressed), *E.*

Syn. Of the Nutmeg; Noix muscade (*F.*), Moscatnuse (*G.*), Nooten-moskat (*Dutch*), Muskad (*Dan.*), Muskot (*Swed.*), Nosce moscata (*I.*), Neuz moscada (*S.*), Noz moscada (*Port.*), Jaêphal (*H.*) Jattipullum (*Cing.*) Jouzbewa (*Pers.*), Jouzalteil (*Arab.*), Woh pala (*Jav.*), Jadicai (*Tam.*), Jayaphula (*Beng.*), Jatiphalo (*San.*), Pela (*Malay*). — *Of the Mace:* Moshat blumen (*G.*), Macis (*I.*), Macias (*S.*), Jawatri (*H.*), Jatipatri (*San.*), Jadiputrie (*Tam.*), Bungabuæ-pala (*Malay*), Kambangpala (*Jav.*), Wassawasel (*Cing.*), Bezbaz (*Pers.*). — *The Oil:* Jadikai tylum (*Tam.*), Jatipullum tail (*Cing.*).

The nutmeg-tree is a native of the Molucca Islands. It has, however, been nearly extirpated from the greater number of them by the narrow policy of the Dutch, and is cultivated at Banda[2], and also at Bencoolen, in the island of Sumatra, where a sufficient quantity is raised to supply with mace and nutmegs the whole of Europe. Mr. Crawfurd states that the tree is also found in Cochin China and in New Holland. It rises to the height of twenty-five feet, producing many erect branches, which, as well as the trunk, exude, when wounded, a yellow juice, and are covered with a smooth, ash-coloured exterior bark. The leaves, which stand alternately on short petioles, are elliptical, pointed, undulated, entire, and obliquely nerved; of a bright green colour on the upper surface, paler underneath, and aromatic. The flowers are present at the same time with the fruit, inodorous, small, supported on axillary racemes: and male and female on the same tree and on separate trees: the calyx in both is fleshy, smooth, covered

[1] In our description, we have followed Gærtner, who denominates the fruit "bacca monosperma;" although, in our translation of the generic character by Willdenow, we have not altered the term "drupa."

[2] This term includes six smaller islands: Neyra, Lenteria, Pulo-Aya, Goenenga Apia, Polerona, and Rossengenia; but the first three only bear nutmeg-trees.

with a dingy red pubescence, and divided at the edge into three moderately spreading, erect, cylindrical segments. There are no corollas. The filaments in the male flowers are short, united into one columnar bundle, bearing each a linear 2-celled anther, which surrounds the upper half of the filament. The germ in the female is superior, oval, and crowned with a style terminated by a 2-lobed, persistent stigma. The fruit is elliptico-spheroidal, something like a small pear, marked with a shallow longitudinal groove on one side, opening into two nearly equal valves, fleshy, and smooth, the flesh is thick, rather solid, and finally dries up to a coriaceous crust, which on opening displays the nutmeg in its shell covered with a closely-adhering, bright scarlet arillus, which is the officinal *mace.* The mace is a fleshy, coriaceous substance, divided deeply into many slips, which so closely invest the shell of the nutmeg as to form inequalities on its surface. The kernel, which is the proper nutmeg, is of a roundish-oval form, marked on the outside with many vermicular furrows, within of a fleshy albuminous substance; variegated whitish and bay, and having a cavity at the bottom for the embryo.[1]

The nutmeg-tree produces fruit at the age of seven years; its productiveness is at the height at fifteen; and it continues to bear for seventy or eighty years in the Moluccas. It yields three crops annually: the first in April, the second in August, and the third, which is the best, in December; yet the fruit requires nine months to ripen it. When it is gathered[2], the outer coriaceous covering is first stripped off, and then the mace, carefully separated, is flattened by the hands in single layers, sprinkled with salt water, and dried in the sun. The nutmegs in the shell are next exposed to heat, not exceeding 140° of Fahr., and to smoke for three months. Much care is necessary in drying them, as they require to be turned every second or third day. The criterion of due preparation is their rattling in the shell. They are then broken, and the kernels thrown into a strong mixture of lime and water, at Banda; but at Bencoolen they are simply rubbed over with dry lime: after which they are cleaned and packed up in casks and chests, smoked, and covered within with a coating of lime and water.[3] This process is necessary for their preservation, for the nutmeg freed from the shell is very perishable: with the same intention the mace is sprinkled with salt water. There are several varieties of the tree; but that denominated the queen nutmeg, which bears a small round nut, is the best. They are

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[1] *Gærtner de Fructibus*, t. 41.

[2] The fruit which falls from the trees affords an inferior nutmeg. A good tree yields annually from ten to fourteen pounds of nutmegs and mace; and the produce of an English acre about 265 pounds.

[3] *Report on the Cultivation of Spices at Bencoolen*, &c. by J. Lumsdaine, Esq.—*Edin. Phil. Journ.* vol. vii. p. 127.

imported in chests, which contain each from 100 to 140 lbs. weight[1]; the mace comes in chests also of different sizes. The nutmeg is, also, imported in the shell. Volatile oil, which is obtained in Banda by the distillation of the nuts, is brought in bottles, and the expressed oil in stone jars. Nutmegs are frequently punctured and boiled in order to obtain the essential oil, and the orifices afterwards closed with powdered sassafras. The fraud is detected by the lightness of the nutmeg. Both the nutmeg and the mace are perforated by the lava of dermestes *Surinamensis.*[2]

Qualities.—The nutmeg has a fragrant, agreeable, spicy odour, and a warm, aromatic taste. It is easily cut with a knife, but is not very pulverulent. When cut transversely and examined by the microscope, the dark-coloured veins which run through its substance appear to consist of cellular matter filled with oil, which is the active matter of the nutmeg. Alcohol and ether extract completely the active qualities of the nutmeg. When the ethereal tincture, which is limpid, and of a golden-yellow colour, is evaporated on water, a small portion of volatile oil unites with the water, whilst a white opaque, granular sebaceous substance, heavier than water, which has much the appearance of the expressed oil, is deposited. When alcohol is digested on this substance, it dissolves very little of it, but becomes yellow, and acquires the qualities of a spirituous solution of the essential oil. The undissolved substance, if washed in water, is nearly insipid, melts at a temperature of 150°; and, on cooling, concretes into a translucent, brittle cake, which has the properties of wax. The part of the nutmeg insoluble in ether is chiefly gum and starch. In distillation with water, nutmegs yield $\frac{1}{32}$ part of their weight of volatile oil, and by expression one-third of a sebaceous fixed oil.[3] Hence, the components of the nutmeg seem to be *starch, gum, volatile oil, wax,* and a *fixed, fat oil.* Bonastre obtained from 500 parts of nutmeg, 120 of *stearine,* 38 of *eläine,* 30 of *volatile oil,* 12 of *fecula,* 6 of *gum,* 4 of *acid,* and 290 of *lignin* and loss.[4] The *volatile oil* possesses the odour and taste of the nutmeg in a concentrated degree, is of a pale straw-colour, limpid, transparent, and lighter than water, deposits crystals which have a composition $C_{16} H_{16} O_5$. Nutmegs yield of volatile oil between 4 and 5 per cent. The *expressed oil,* when first drawn, is limpid and yellow, but on cooling acquires the consistence of spermaceti, and somewhat of the appearance of Castile soap, being whitish, mottled with reddish brown. It is imported wrapped up in flag-leaves.

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[1] The annual consumption of nutmegs in England is 56,960 lbs. and of mace 3620 lbs. *Crawfurd's Indian Archipelago.*

[2] *Leuwenhoek, Epist.* 92.

[3] *Neuman's Chymistry,* 404.

[4] *Journ. de Pharm.* ix. 281.

Its odour is agreeable and slightly aromatic: its taste fatty, pungent, and bitterish. It appears to be a vegetable cerate, or a compound of *fixed* oil, *volatile* oil, and *wax.* The solid fat has been named Myristicine, and is resolved by saponification into myristic acid ($C_{28}\ H_{27}\ O_3 + HO$) and glycerine. Myristic acid melts at 120° F. Myristicine is deposited in crystals from a hot alcoholic solution of the nutmeg fat. Boiling alcohol should dissolve one-fourth of its weight of the true fat. Besides the genuine expressed oil, there are two other sorts found in the shops; one, which is said to come from Holland, of a paler colour, and in flat square cakes or *bricks;* and another, which is an artificial composition of *suet, palm* oil, and *spermaceti,* scented with a little volatile oil of nutmeg.

Mace resembles the nutmeg in its odour and taste, but is more pungent and bitter. It is in laciniated, flexible, thin pieces, unctuous to the feel, and of a pale reddish-yellow colour, although in the recent fruit it is of a deep-red colour. Alcohol and ether extract its active principles; and, when the ethereal tincture is evaporated on water, a thick, deep yellow coloured, very pungent, and odorous oil is left in drops on the surface of the water, with some resin; whilst a small portion of extractive is deposited, but no waxy granular matter. It is not officinal in any British Pharmacopœia.

Medical properties and uses.[1]—The medical properties of nutmegs depend on the volatile oil they contain, which is stimulant, carminative, and, in large doses, narcotic. Both the nutmeg and its volatile oil are in frequent use to cover the disagreeable taste of other medicines; and they are sometimes ordered in cases of languors, vomiting, and diarrhœa, and in flatulent colic. On account of the narcotic property of the oil, the nutmeg should be cautiously employed in apoplectic and paralytic habits. In India, its dangerous effects have been frequently felt[2]; and in this country, instances have occurred in which the nutmeg, taken in large quantity, produced drowsiness, great stupor, and insensibility; and, on awakening, delirium which alternated with sleep for several hours.[3] The volatile oil is sometimes used as an external stimulant; the expressed oil is seldom employed for any other purpose, and is contained in the Emplastrum Picis, *L. E.* The dose of the nutmeg is from grs. v. to ℈j.; that of the volatile oil, ♏ij. to ♏iv., combined with sugar as an oleosaccharum.

Officinal preparations.—*Oleum Myristicæ Moschata,* D. *Spiritus Myristicæ,* L. E. *Essentia Myristicæ Moschatæ,* D.

MYROXYLON. *Spec. Plant. Willd.* ii. 546.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Leguminosæ.

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[1] Avicenna first notices nutmegs as a medicine.

[2] *Bontius de Medicinâ Indorum,* 20.

[3] *Cullen Mat. Med.* ii. 204.

G. 829. *Calyx* bell-shaped, five-toothed. *Petals* five, the upper one larger than the others. *Germen* longer than the corolla. *Legume* with one seed only at the point.

Species 1. M. *peruiferum.* Sweet-smelling Balsam tree. *Hernandez, Nova Plant., &c. Mexican. Hist. fol.* 51. *cum figurâ. Nees Von. Esen.*, 321.

Species 2. M. *toluiferum.*

Officinal. BALSAMUM PERUVIANUM, *Lond. Edin.* Peruvian Balsam. The balsam flowing from the incised trunk of uncertain species of Myrospermi (Myroxili), *L.* Fluid balsamic exudation of Myrospermum peruiferum, *E.*

Syn. Beaume de Pérou (*F.*), Peruvianische Balsam (*G.*), Peruviaanische Balsam (*Dutch*), Swart Perubalsam (*Swed.*), Sart Peruviansk Balsam (*Dan.*), Balsamo del Peru (*I.*), Balsamo de Quinquica vel negro (*S.*), Balsamo Peruviano (*Port.*), Peruvianskoi Balsam (*Russ.*).

The Peruvian balsam-tree is a native of the warmest provinces of the continent of South America, growing in the mountains of Panatalmas[1], in the forests of Puzuzu, Muna, Cuchero, Paxaten, and many other places near the river Maranon, blossoming in August, September, and October. It is a very beautiful tree, with a smooth, thick, straight trunk, covered with a grey, coarse, compact, heavy bark, which is interiorly of a straw colour, and very resinous, as is every part of the tree. The branches extend almost horizontally. The leaves are alternate, and abruptly pinnate. The leaflets in two pairs, nearly opposite, petiolate, ovato-lanceolate, with the apex lengthened and somewhat blunt and emarginate, entire, shining, veined, and very smooth. The midrib, which runs through the whole length of the under-surface of the leaf, is raised and pubescent; the common petiole is round and pubescent. The flowers are scattered, on axillary, erect racemes, longer than the leaves. The peduncles are roundish and pubescent; each supported by a small, erect, ovate, concave bract, appearing to the naked eye like a tubercle; the pedicels are erect. The calyx is bell-shaped, dark green, divided into five small, nearly equal teeth, but with one of them so far separated as to be found under the germen. The corolla consists of five white petals: four narrow, equal, lanceolate, and larger than the calyx; the fifth reflex, broad, and double the size of the others. The stamens are ten, inclining, and inserted into the calyx; bearing elongated, sharp-pointed, sulcated anthers. The germen is oblong, pedicillated, inclining; the style short, subulate, and crooked, crowned with a simple stigma. The seed-vessel is a straw-coloured, club-shaped, somewhat curved, pendulous legume, globular near the top, and terminated by the curved style. It contains, in a cell in the curved part, one seed only, which is crescent-shaped, and

[1] Mutis discovered it, and sent a branch of the tree to the younger Linnæus, about the year 1781.

projects from the cell. The substance of the leaves is full of translucent, linear points, like the leaf of the orange-tree.

This tree is called *quinquino* by the natives, and also *hirtziloxitl, cabureiba,* under the first of which names it was described by Hernandez, and under the second by Piso. The natives use the bark as a perfume. The balsam, which is procured in a liquid state, from incisions made early in the spring, is collected in bottles, and is called *white liquid balsam.* What is found in the shops, *blackish-red liquid balsam,* is obtained either by boiling the twigs in water, or by putting the end of a billet of the wood in a fire, and thus forcing out the balsam at the opposite end. It is imported in jars, each containing from twenty to forty pounds weight. When the Indians collect the white balsam in calabashes, which is the case in Carthagena, and in the mountains of Tolu, it condenses and hardens, and forms *dry white balsam,* or the *balsam of Tolu.* Ruiz says there is no difference in these balsams, excepting in name, colour, and consistence. A mixture of *brown resin* and some *volatile oil* with benzoin is often sold for Peruvian balsam; and the fraud is not easily detected.[1]

Qualities.—The balsam which we receive has a fragrant aromatic odour, much resembling that of benzoin, with a warm, bitterish taste, leaving a slight sensation of burning in the throat after it is swallowed, with some degree of sweetness. It is viscid, of a deep, reddish-brown colour, being that which is obtained by boiling the twigs, and of the consistence of fluid honey. Its sp. gr. is 1·14 to 1·15. Water boiled on the balsam becomes acidulated, and deposits on cooling crystals of benzoic acid. In distillation with water, a small portion of a volatile, limpid oil comes over, and benzoic acid (?) sublimes in the neck of the retort. Its remaining matter is a resin. Ether, in small quantity, dissolves it readily and completely; alcohol also dissolves it, but the quantity of menstruum must be considerable. Sulphuric acid converts it into artificial tannin and charcoal. Treated with nitric acid, some prussic acid is formed, benzoic acid sublimes, and the residual matter is artificial tannin.[2] The alkalies and their carbonates form with it thick masses, which, on the addition of sulphuric acid, let fall a resinous matter, and benzoic acid (?) crystallizes. Hence Peruvian balsam appears to consist chiefly of *resin, volatile oil, benzoic acid* (?), and *extractive;* but according to Stoltze the oil is of a peculiar nature, differing from volatile oil. It has been named *cinnameine.* The result of his analysis is, that 1000 parts

[1] Dr. Pereira has recently published a paper in the Pharmaceutical Journal, vol. x. p. 280., in which he describes specimens received from Central America of the plant which yields the Balsam of Peru, and which he describes under the name of the "Myrospermum of Sonsonate." To this paper we refer those of our readers who are desirous of obtaining further knowledge of the botanical characters of the plant.

[2] *Hatchet. Phil. Trans.* 1806. *Thomson's Chymistry,* 4th edit. v. 126.

of the balsam consist of 24 of *brown,* nearly *insoluble resin,* 207 of *soluble resin,* 690 of *the above oil,* 64 *benzoic acid,* and 6 of *extractive* matter. The chemistry of Peruvian balsam is as yet by no means satisfactorily made out. When the balsam is heated with a solution of potassa sp. gr. 1300, a yellowish oil floats at the top, and a dark syrup, containing the potassa, and soluble in water, remains below. The former, when purified by distillation, is named by Frémy *Cinnameine*: it is clear and colourless, and has had the formula $C_{54}\ H_{26}\ O_8$ assigned to it: when boiled with strong alkalies, it is decomposed into *cinnamic acid* ($C_{18}\ H_7\ O_3$), and an oily liquid, lighter than water, called *peruvine* ($C_{18}\ H_{12}\ O_2$), and the decomposition may be thus represented: 1 eq. of cinnameine ($C_{54}\ H_{26}\ O_8$) $=$ 2 eqs. cinnamic acid 2 ($C_{18}\ H_7\ O_3$) + 1 eq. of Peruvine ($C_{18}\ H_{12}\ O_3$).

It is probable that the acid obtained in many of the old analyses was cinnamic, and not benzoic acid.

Medical properties and uses. — Balsam of Peru is stimulant and tonic. It has been regarded as expectorant also, and recommended in catarrh and other pulmonary affections; but it is contra-indicated wherever any inflammatory action is present; and to its stimulant operation on the pulmonary exhalants we may ascribe its use in chronic asthma and old obstinate coughs.[1] In gleets, leucorrhœa, palsy, and chronic rheumatism, its tonic powers have proved beneficial; as well as in many other cases of debility. It may be given to the extent of f ʒss. for a dose. As a local stimulant it is employed externally with great advantage for cleansing and stimulating foul and indolent ulcers; and a mixture composed of ʒ j. of the balsam and ʒ iij. of ox-gall, I have found extremely useful when dropped into the ear every day, after syringing with a weak solution of soap, in fœtid discharges of the ear.

This balsam enters the composition of fumigating pastiles.

BALSAMUM TOLUTANUM.

Officinal. BALSAMUM TOLUTANUM, *Lond. Edin. Dub.* Tolu Balsam. The concrete balsam flowing from the incised trunk of Myrospermum Toluiferum, *L.* Concrete Balsamic exudation of Balsamum Toluiferum, *E. D.*

Syn. Beaume de Tolu (*F.*), Tolutanischer Balsam (*G.*), Balsama Tolutano (*I.*), Balsamo de Tolu (*S.*).

The tree which yields the balsam of Tolu has been ascertained[2] to be the Myroxylon *Peruiferum,* the same from which the balsam of Peru is procured.[3] The Tolu balsam is the white balsam of

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[1] Sydenham gave it in phthisis.

[2] Vide *A Description of the Tree named Quinquino in Peru, &c. By Don Hippolito Ruiz;* translated in *Lambert's Illustrations of the Genus Cinchona,* 4to. Lond. 1821, p. 92.

[3] Some botanists still think the B. Toluiferum a distinct species, and it is thus con-

Peru, hardened by exposure to the air. It is obtained from incisions of the bark, from which it flows freely in hot weather; and is afterwards put into mats and calabashes to condense and harden, in which state it is brought to this country. It is exported from Carthagena, Santa Martha, and Savanilla.

Qualities. — Balsam of Tolu has an extremely fragrant lemon odour, and a warm, somewhat sweetish taste. It is of a yellow, reddish-brown colour, and of a thick tenacious consistence, becoming solid and brittle by age. Exposed to heat it melts, easily inflames, and disperses, along with its peculiar odour, that also of benzoic acid. In distillation with water, it yields a small portion of volatile oil, impregnates the water with its odour, and by continuing the process cinnamic acid sublimes. It is soluble in alcohol, forming a tincture which is rendered milky by water, but no precipitate falls. Mr. Hatchett found, that when it is dissolved in the smallest quantity of solution of potassa, its own odour is lost, and it acquires a permanent, fragrant odour, resembling that of the clove-pink. When digested in sulphuric acid, a considerable quantity of pure benzoic acid sublimes; and the same occurs during its solution in nitric acid, which also evolves traces of hydrocyanic acid. There is still some uncertainty with regard to the chemical composition of Tolu balsam. It yields by distillation a *volatile oil,* a hydrocarburet isomeric, with essential oil of turpentine, to which the name of Toléne was given by Kopp ($C_{10}\ H_8$). The *acid* formerly considered to be benzoic, has been shown to be *cinnamic* acid by Frémy, and the benzoic acid obtained has been thought to be a product of the decomposition of the resin by heat or alkalies. Cinnamic acid is represented by the formula $C_{18}\ H_7\ O_3 + H\ O$. The *resin* is complex, consisting of at least two acids, — one very soluble in alcohol, the other very slightly so. Tromsdorff found in a specimen of the balsam 88 parts of resin, 12 of cinnamic acid, and 0·2 of volatile oil in 100 parts; but the proportions of the ingredients are subject to much variation, dependent on age, &c.

Frémy considers that the balsam of Tolu has a similar composition to that of the balsam of Peru.

Medical properties and uses. — Tolu balsam is a stimulating expectorant; and although less heating than the other balsams, is

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sidered by the British colleges. "According to Richard, who had an opportunity of examining specimens brought from South America by Humboldt, the leaflets of the M. Peruiferum are thick, coriaceous, acute, blunt at the apex, and all equal in size; while in M. Toluiferum, the leaflets are thin, membranous, obovate, with a lengthened and acuminate apex, and the terminal one is the longest. M. Peruiferum is found in Peru and the southern parts of New Grenada; M. Toluiferum grows in Carthagena, and abounds especially in the neighbourhood of Tolu. The wood of the latter species, according to Humboldt, is of a deep red colour, has a delightful balsamic odour, and is much used for building." — *United States Dispensatory.*

nevertheless improper in pulmonic affections attended with inflammation. It forms an elegant addition to more active medicines in cases of asthma and chronic catarrh; and on the whole it is more employed on account of its agreeable flavour than for any efficacy it possesses. The dose of the balsam may be from grs. v. to ʒ ss., suspended in water by means of mucilage or yolk of egg.

Officinal preparations. — *Tinctura Tolutani,* L. *Tinctura Tolutana,* E. D. *Syrupus Tolutanus,* L. E. D.

MYRRHA, see *Balsamodendron.*

MYRTUS. *Spec. Plant. Willd.* ii. 967.

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. ord.* Myrtaceæ.
G. 973. *Calyx* five-cleft, superior. *Petals* five. *Berry* two or three-celled, many-seeded.
Species 28. Myrtus *Pimenta.* Pimenta or Allspice-tree. *Med. Bot. 3d edit.* 541. *t.* 194. *Hayne,* x. 37. Eugenia Pimenta. *De Candolle.*
Officinal. PIMENTA, *Lond. Edin. Dub.* Pimenta berries. Jamaica Pepper. The unripe berries of Eugenia Pimenta.

Syn. Poivre de Jamaique (*F.*), Nelkenpfeffer (*G.*), Jamaika pepper (*Dutch*), Krydd peppar (*Swed.*), Pimenti (*I.*), Pimienta (*S.*), Pimenta da Jamaica (*Port.*).

This tree is a native of South America, where it is called Pumake (in the Maypure language), and of the West India islands. It grows in great plenty on the hilly parts, on the north side of the island of Jamaica; flowering in June, July, and August, and soon afterwards ripening its fruit. It is a handsome tree, rising in height about thirty feet, straight, branching, and covered with a very smooth grey bark. The leaves, which are supported on footstalks at the ends of the twigs, are elliptical, pointed, of different sizes, but the largest are five inches long, and two broad in the middle, smooth, thin, entire, shining, and of a deep-green colour. The flowers are produced in terminal bunches, or rather are trichotomous panicles: the calyx is four-cleft; the petals four, reflected, of a pale green colour, enclosing many long, spreading filaments of the same colour, supporting pale-yellow, roundish anthers. The fruit is a spherical berry, crowned with the persistent calyx: when ripe, it is black, or dark-purple, viscous on the outside, smooth, shining, and bilocular, with the seeds enveloped in a moist, green, pungent, aromatic pulp.[1]

The fruit, which is the part of this plant medicinally used, is gathered before it is ripe [2], and exposed to the sun for many days, spread thin upon cloths. They require to be frequently turned

[1] Sloane, *Phil. Trans.* xvii. 462.

[2] When the berries ripen, they lose much of the aromatic warmth for which they are esteemed, and acquire a taste similar to that of the fruit of juniper.

and carefully preserved from the dews. By degrees, under this management, they become wrinkled, and change from green to a brown colour; after which they are packed in bags and hogsheads for the European market. The more fragrant and smaller they are, the better they are accounted.[1]

Qualities. — Pimenta has a powerful aromatic, agreeable odour, resembling that of a mixture of cinnamon, cloves, and nutmegs [2], with the warm pungent taste of the cloves; qualities which reside chiefly in the cortical part of the dried berry. Water, alcohol, and ether extract its virtues. The watery infusion is of a brown colour, and reddens litmus. With solution of sulphate of iron it immediately strikes a deep black colour, and slowly lets fall a precipitate. Nitrate of mercury precipitates it of a yellowish-brown; acetate of lead, of a dirty-green; and nitrate of silver, of a deep reddish-brown colour. It is also precipitated by infusion of yellow cinchona bark. The sulphuric and hydrochloric acids redden it, and throw down pale, rose-coloured precipitates. The nitric acid forms no precipitate, but gives the infusion a yellow hue. The alcoholic tincture is rendered milky, and slowly precipitated by water: the ethereal, when evaporated on water, deposits drops of a greenish-yellow, heavy, volatile oil; and leaves a pellicle of a pungent, nauseous-tasted resin, and some extractive. Hence pimenta appears to contain a *volatile oil, resin, extractive,* and *tannic acid.* According to Bonastre, the shell or testa, which is the most active part, contains 10·0 of *volatile oil,* 8·4 *green oil,* 0·9 *solid fat,* 11·4 *astringent extract,* 3·0 *gummy extract,* 4·0 *colouring matter,* 1·2 *resin,* 3·0 *uncrystallizable sugar,* 0·6 *malic acid,* 2·8 *salts,* 3·5 *water,* 51·6 *lignin and loss* = 100·0.[3] For properties of the volatile oil, see *Pimentæ Oleum.*

Medical properties and uses. — Pimenta is stimulant and tonic. It is useful as an adjunct to bitters in dyspepsia, attended with much flatulence, and in arthritic and hysterical affections. The watery infusion of it, sweetened with sugar, and with the addition of a little milk, is very readily taken by children; and is an excellent cordial in malignant measles, scarlatina, confluent small-pox, and the other exanthemata, when the fever assumes the typhoid type. But the most common use of Pimenta in medicine is to cover the disagreeable taste of other remedies, or to give them warmth. The dose is from grs. v. to ℈ ij., in powder, or in their entire state.

Officinal preparations. — *Aqua Pimentæ,* L. E. D. *Spiritus Pimentæ,* L. E. *Essentia Pimentæ,* D. *Oleum Pimentæ,* E. D. *Pimentæ Oleum,* L. See Part III.

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[1] Sloane, l. c.
[2] The term *allspice* is derived from these mixed qualities.
[3] *Journn. de Chim. Méd.* i. 210.

NARTHEX. See *Ferula.*

NECTANDRA RODIÆI. See *Rodiæi Nectandra.*

NEPHRODIUM FILIX-MAS. See *Aspidium.*

NICOTIANA. *Spec. Plant. Willd.* i. 1014.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.
G. 379. *Corolla* funnel-shaped, with the border plaited. *Stamens* inclined. *Capsules* two-valved, two-celled.
Sp. 1. N. *Tabacum.*[1] Tobacco. *Med. Bot. 3d edit.* 208. *t.* 77.
Officinal. TABACUM, *Lond. Edin. Dub.* Tobacco-leaves. Leaves of Nicotiana Tabacum.

Syn. Tabac (*F.*), Toback (*G. Dutch*), Tobak (*Dan. Swed.*), Tabak (*Pol.*), Tabak (*Russ.*), Tabacco (*I.*), Tobaco (*S.*), Herva Santa (*Port.*), Poghei elly (*Tam.*), Bujjer bang (*Arab.*), Doorkole (*Cing.*), Poghei (*Tam.*), Tam bacoo (*Malay*), Tamboco (*Jav.*), Tambácu (*H.*), Támracuta (*San.*), Quauryetl (*Mexican*), Sang-yen (*Chinese*).

Tobacco is an annual plant, a native of America, and partially cultivated in Europe; flowering in July and August. The root is large and fibrous, and sends up an erect, branching stem, about four feet in height, round, villous, slightly viscid, and furnished with numerous large, alternate entire, pointed leaves, the lowermost of which are about two feet long and four inches broad; they are sessile, a little decurrent, with a strong midrib, and of a pale-green colour on the upper surface, and still paler underneath. The flowers are in large terminal panicles, with long linear-pointed bracts at the base of each division: the calyx is bell-shaped, obscurely pentangular, villous, slightly viscid, and cleft into five acute, erect segments; the corolla is very viscid, its tube twice the length of the calyx, of a pallid greenish hue, and swelling into an oblong cup, which expands into five pointed, plaited, pale-red, or

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[1] This plant was first discovered by the Spaniards in Yucatan in 1520, and was there called *petun* or *petema.* Humboldt says it has been cultivated from time immemorial by the native people of the Oroonoko; and was smoked all over America at the time of the Spanish conquest. He found only two of the species cultivated in Europe, the N. *puniculuta*, and N. *glutinosa*, growing wild; but the N. *loxensis* and *andicola*, which he found on the Andes, 1850 toises of elevation, closely resemble the *tabacum* and *rustica.* It is said to have been used as a medicine from time immemorial by the Chinese and the Persians. But it was transported to the West Indies and North America; and brought to Europe by Hernandez de Toledo, who came from Florida to Portugal in the beginning of the 16th century. The seeds were sent from Portugal to Catherine de Medicis by Jean Nicot, an agent of Francis II., after whom it received its generic name Nicotiana; it was also called *Herbe* à la reine. The specific appellation is taken from *tabac*, the name of an instrument used by the natives of America in smoking the herb. The following are the names by which it is known in America: *yeth* in the Mexican or Azteek tongue; *sema* in Algonkiu; *oyugoua* in the Huron; in the Peruvian it is *sayri;* in Chiquito, *pâis;* in Vilela, *tusup;* Mbaja, *nalodagadi;* Moxo, *Sabare;* Omagua, *potema;* Tumanac, *cavai;* Maypure, *jema;* and Cabre, *sena.* — Humboldt, *Person. Narr.* vol. v. p. 666.

rose-coloured segments: the stamens are the length of the tube of the corolla, and support awl-shaped, compressed, oblong anthers: the style, which is the length of the corolla, and crowned with a capitate, slightly-cleft stigma, rises from a conical germen, that changes to an ovate capsule containing many reniform, small, brown seeds, and opening crossways, loculicidal at the apex.

Tobacco was at one period raised to a considerable extent in Yorkshire[1], but the cultivation of it for the purposes of trade has been long prohibited in this country, which, with the greater part of Europe, is chiefly supplied from Virginia, where the plant is reared in the greatest abundance. There are two varieties of this species, which is known by the name of *Virginian tobacco,* a broad and a narrow-leaved sort; but they do not differ in their medical properties. In Virginia, the plant is not allowed to attain its full height, but is topped whenever a certain number of leaves is thrown out; by this process it becomes bushy, and the leaves are known to be fit for being cut when a small bluish spot shows itself on the point of union between the leaf and the stem. The plant is cut down in August, and it is not considered good if gathered in damp weather, or when the sun is not in full force. The plants are hung up in pairs, in sheds, to dry; after which the leaves are separated from the stem, bound up in bundles, and packed in the hogsheads in which they are exported.[2] Besides Virginian tobacco, some is imported from *Maryland, Kentucky,* and *Carolina.* The best is brought from the *Havannah.*

Qualities. — The recent leaves possess very little odour or taste; but when dried their odour is strong, narcotic, and somewhat fetid; their taste bitter and extremely acrid. When well cured, their colour is brownish or yellowish-green. They emit sparks in burning, and give out a suffocating smoke; and, when distilled, yield an empyreumatic volatile oil of a dark-green colour, on which much of their medicinal properties depend, and which is said to be a very virulent poison.[3] This oil is dissipated by the

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[1] It was first cultivated in England in 1570, according to Lobel's account.

[2] The Creoles of Tierra Firme cure their tobacco in two ways: the first stage of the *cura seca*, or dry preparation, is nearly the same as that used in Virginia; but the leaves are next stripped of their midrib, and formed into balls to ferment; after which they are unrolled, and undergo a variety of treatment until they are dry; the *cura nigra,* or black or fluid preparation, is somewhat different, and intended to get the juice from the leaves; after various fermentations this is boiled to the consistence of a syrup, and is in great request, particularly with the females, who relish it as sailors do the chewing of the tobacco.

[3] The poisonous effects of this oil are very powerful. Mr. Barrow, speaking of the use which the Hottentots make of tobacco-oil for destroying snakes, says, "A Hottentot applied some of it from the short end of his wooden tobacco-pipe to the mouth of a snake, while darting out his tongue. The effect was instantaneous as an electric shock; with a convulsive motion that was momentary, the snake half untwisted itself, and never stirred more; and the muscles were so contracted that the whole animal felt hard and rigid, as if dried in the sun." — *Travels in Africa*, p. 268.

long coction of tobacco with water; yet, in distillation with ether, water, or alcohol, no oil comes over. By infusion, however, it yields its active principles to all of these fluids. The deflagration of tobacco shows the presence of nitrate of potassa; and Bouillon La Grange discovered chloride of potassium in its inspissated juice.[1] According to Vauquelin, tobacco appears to contain *albumen* or *gluten, supermalate of lime, acetic acid, nitrate of potassa, chloride of potassium, hydrochlorate of ammonia,* a *red matter* soluble in alcohol and water, a *green fecula,* and a peculiar substance on which the properties of the plant appear to depend, and which has been therefore named *nicotine.* This substance is procured best by making a watery solution of tobacco, agitating with caustic potassa, to set free the nicotine from the acid with which it is combined in the plant; agitating with ether, which dissolves the liberated nicotine: on decanting and distilling the ether, first with a gentle heat, then at a higher temperature, the nicotine is left in the retort free from ether, and may be afterwards obtained by the application of a still greater heat. The following, according to Orfila, are the properties of nicotine: it is an oleaginous liquid, transparent and colourless, of a density 1·048, gradually becoming yellow and thick when kept for a long time exposed, from the absorption of oxygen: it volatilises at 482° F., and is partly decomposed; it is very soluble in water, soluble also in alcohol and ether; its solutions have a powerful alkaline reaction: it combines with acids, and forms salts which are difficult to crystallize, and very deliquescent. Nicotine is coloured red by cold sulphuric acid; it is precipitated from its solutions by bichloride of mercury, acetate of lead, proto- and bichloride of tin, chloride of platinum, and tannic acid. The formula for nicotine is $C_{20}\ H_{14}\ N_2$, or $C_{10}\ H_7\ N$.[2] Nicotine is a very energetic poison, and was recently employed in Belgium by Count Bocarmé, for the purpose of poisoning Gustave Fougnies. The volatile oil of tobacco[3] has been named *Nicotianin,* and is procured by distilling tobacco leaves with water. The oil is solid; it swims on water, and has the odour of tobacco, and a bitter taste. It is soluble in ether and liquor potassæ.

Medical properties and uses. — Tobacco is narcotic, sedative, emetic, diuretic, cathartic, when it is taken into the stomach, and errhine when it is externally applied. The three first-mentioned properties are sufficiently obvious, even from the effects which smoking or chewing produce on persons unaccustomed to its use.[4]

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[1] *Journal de Physique,* xxxix. 193.

[2] *Memoir sur la Nicotine et sur la Conicine,* par M. Orfila. Paris, 1851.

[3] The empyreumatic oil formed, when tobacco is smoked, is a compound *nicotina* and a volatile oil.

[4] The custom of smoking tobacco was introduced into England by Sir Walter

From Sir B. Brodie's experiments, the infusion of tobacco produces its effect on the heart through the medium of the nerves. The symptoms are, very severe sickness, headache, extreme debility, cold sweats, aud sometimes even convulsions. The production of such a state of the habit, however, being useful for relieving violent spasmodic constriction, tobacco is advantageously employed in obstinate constipation, ileus, suppression of urine, and incarcerated hernia, when other remedies fail of affording relief. The smoke is either thrown into the rectum by means of a pair of bellows, of a peculiar construction, or an infusion of the leaves is exhibited in the form of enema. [1] From its narcotic power, also, the smoking or chewing tobacco has been found useful in allaying the pain of toothache; and smoking it has been recommended, and in some instances found useful, in shortening and rendering more supportable the paroxysm of spasmodic asthma. The infusion has been used as an emetic; but the practice cannot be recommended: and notwithstanding the extraordinary success of Dr. Fowler[2], who employed it in dropsy and dysury, its general effects are too violent for internal exhibition; and it is not equal as a diuretic either to squill or foxglove, which are more manageable remedies. In dysury, however, as Dr. Pearson has observed, its antispasmodic properties are of advantage, and consequently its use in that complaint is less objectionable. [3] The external application of a strong infusion of tobacco, or of a cataplasm of the moistened leaves themselves, is sometimes employed as a local stimulant in porrigo, scabies, and some other cutaneous eruptions; but even in this mode of using it, tobacco is apt to induce the same

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Raleigh, and was at one time extremely prevalent, but is now confined chiefly to the lower class of the people. (?) In some parts of Europe, however, it is still regarded as the greatest solace and pleasure of the luxurious. It is a curious fact that in England an edict was published against its use, the reason of which was probably the apprehension thus stated by Camden: — " Anglorum corpora in barbarorum naturam degenerasse, quum iidem ac barbari delectentur." — *Annal Eliz.* p. 143. James I. wrote against it: Urban VIII., in the beginning of the 17th century, anathematised those who used it in churches; and in Constantinople, where its use is now so general, the custom was, in the beginning of the 17th century, thought so ridiculous and hurtful, that any Turk who was found smoking was conducted in ridicule through the streets with a pipe transfixed through his nose. Tobacco, which has been introduced into the Sandwich Islands by Europeans, " is now," says Kotzebue (vide *Voyage of Discovery*), " so generally used that young children smoke before they learn to walk, and grown-up people have carried it to such an excess, that they have fallen down senseless, and often died in consequence." In the province of Varinas, in South America, the women carry the *chimoo*, which is a preparation of inspissated tobacco juice, in a small box, which they wear like a watch, suspended to one side at the end of a string. Instead of a key it is furnished with a little spoon with which they help themselves from time to time, relishing it in their mouths like a sweetmeat. *Colombia*, vol. ii. p. 116.

[1] The native doctors in India apply the leaves to the orifice of the anus. Vide *Ainslie's Mat. Med. of Hindostan*, 4to. p. 48.

[2] *Med. Reports on the Effects of Tobacco*, &c. Of thirty-one cases treated by Dr. Fowler, sixteen were cured, ten relieved, and five received no benefit.

[3] *Practical Synopsis*, &c. 228.

virulent effect as when it is internally administered in large doses.

But tobacco is chiefly employed as a sternutatory, and is the basis of all the kinds of *snuff* generally used.[1] The powdered leaves, when snuffed up the nostrils of those unaccustomed to the use of snuff, excite vehement sneezing, and promote a considerable discharge from the nostrils, answering all the purposes for which errhines are employed. As a luxury, snuff has been used upwards of two hundred years in Britain, and has been taken in great quantities without any perceptible bad consequence; although it has been asserted that its immoderate use weakens the sight, produces lethargy, and gives a tendency to apoplexy. After the use of it has become habitual, it cannot be relinquished without considerable risk, arising from the suspension of the artificial discharge it produces, as Dr. Cullen observed from his own experience.[2]

The British Colleges have given a formula for an infusion proper to be used as an enema (see *Preparations*, Part III.): as a diuretic, the infusion employed by Dr. Fowler is made with ℥j. of the dried leaves, and Oj. of boiling water, and given in doses of ♏ lx. to ♏ lxxx. twice a day.

Officinal preparations.—*Enema Tabaci*, L. E. D. *Vinum Tabaci*, E.

NUX MOSCHATA. See *Myristica*.

NUX VOMICA. See *Strychnos*.

OLEA. *Spec. Plant. Willd.* i. 44.

Cl. 2. *Ord.* 1. Diandria Monogynia. *Nat. ord.* Oleaceæ.
G. 36. *Corolla* four-cleft, with subovate segments. *Drupe* one-seeded.
Species 1. O. *Europæa.*[3] European Olive. *Med. Bot. 3d edit.* 280. *t.* 93. *Sibthorp, Flora Græca, t.* 3. *Hayne*, x. 9.
Officinal. OLIVÆ OLEUM, *Lond. Edin. Dub.* The Oil of the Olive, expressed from the fruit.

Syn. Huile d'Olive (*F.*), Olivenhöl (*G.*), Olyfoly (*Dutch*), Bamolja (*Swed.*), Bomalia (*Dan.*), Olivkovoe maslo (*Russ.*), Oglio d'Uliva (*I.*), Azeyte (*S.*), Olo comuno (*Port.*), Zeet (*A.*), Iban Zeitan Agazi (*Turkish*).

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[1] In the manufacture of snuff, it is said that salt, urine, hydrochlorate of ammonia, and even powdered glass, are added to the tobacco: but an eminent manufacturer assures me that none of these articles are used. The difference of flavour depends, in some, on the species of nicotiana employed, but chiefly on the preparation of the leaves, and these having undergone fermentation. *Macouba* derives its flavour from the leaves being fermented with an addition of the best cane-juice.

[2] *Materia Medica*, ii. 437. The editor had lately under his care an old gentleman, 82 years of age, who suddenly left off the use of snuff, although he had taken it in large quantities for more than fifty years; he lost all desire for it.

[3] Ἐλαια αγραια, Dioscoridis. Αγροελια of the modern Greeks. Unclarified oil is called oglio *misto*; the clarified, oglio *chiaro*, in Italy.

The olive-tree is a native of Asia, and the north of Africa, where it is named Zituna; but it is cultivated abundantly in the Greek islands near Smyrna, in France, Spain, and Italy. It has been raised in the open air, but its fruit, it is said, has never been ripened in England.[1] It grows upon the rocky, calcareous soil, seldom exceeds twenty feet in height, and has a solid, upright, much-branched stem, covered with a grey bark: the leaves are evergreen, opposite, spreading, nearly sessile, stiffish, lanceolate, entire, from two to three inches long, and scarcely half an inch broad in the middle, with the margin a little turned back; of a full green colour, smooth and even on the upper surface, and pale on the under. The flowers are in opposite, axillary clusters, half the length of the leaves, on short flower-stalks, with small, concave, obtuse, hoary bracts: the calyx is deciduous, four-cleft, and regular: the corolla white, four-parted, regular, spreading; with ovate, obtuse, obscurely three-nerved segments; the stamens are shorter than the corolla, divaricated, supporting large, pale-yellow, elliptical anthers; the stigma is bipartite on an erect style, rising from a roundish, superior germen; the fruit is a smooth oval plum, or *drupe*, about three-fourths of an inch in length, and half an inch in diameter: of a deep violet colour when ripe, whitish and fleshy within, bitter and nauseous, but replete with a bland oil[2], and covering an osseous, oblong, pointed rough nut. There is a variety with shorter, almost obovate leaves.[3]

There are several varieties of the olive tree, of which the variety γ, or *longifolia* of Willdenow, is most esteemed, as affording the best oil. The young plant bears at two years old, and at six years is in full bearing; but the best oil is procured from the fruit of trees which have been grafted. The value of the tree continues to increase until it has passed its one hundredth year, after which it declines.[4] The mode of obtaining the oil from the ripe fruit was known very early in Egypt; and it is chiefly for this purpose that the tree is now cultivated in Spain, Provence, and Italy. To

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[1] *Miller's Gardener's Dictionary*, ed. 1797, art. *Olea.* I have been informed, however, that it has ripened its fruit in Devonshire. The olive attains to a great age. Chateaubriand says that in the olive garden at Jerusalem are eight olive trees, which pay one *media* only each to the Grand Seigneur, a proof that they were in existence and bearing fruit before the Turkish invasion, as all olives planted since that time pay half their annual crop. There is an olive tree at Pescio, in Italy, 700 years old, and 25 feet in circumference.

[2] The unripe fruit, when pickled in a strong solution of common salt, is a well-known luxury of the table.

[3] The wild olive is distinguished by the more oval shining leaf, the flower exactly similar to the cultivated, the leaves of which are lanceolate, and remarkably grey in appearance compared to the wild. The olive was cultivated long before the Christian æra, for Cato, who wrote 150 years A.C., gives directions to "lay dung round the roots of olives in antumn."

[4] A very old olive tree, near Gerecomio, yielded 240 English quarts of oil in 1809. — *Three Months near Rome*, by Maria Graham, p. 49.

procure the oil, the ripe fruit is gathered in November, and immediately bruised in a mill, the stones of which are set so wide as not to crush the nut. The pulp is then subjected to the press in bags made of rushes; and, by means of a gentle pressure, the best oil, which is called virgin oil, flows first; a second sort is got by breaking the marc, moistening it with warm water, and returning it to the press; and lastly, a very inferior kind is obtained, either by boiling the magma, or by breaking, moistening, and fermenting it in large cisterns, and again submitting it to the full force of the press. When the olive is not sufficiently ripe, the recent oil has a bitterish taste, and when too ripe it is thick and glutinous. After the oil is drawn, it deposits by standing a white, fibrous albuminous matter; from this the clear oil is poured off, and a second deposition takes place; after which, if put into clean glass flasks, there is no further alteration.

The best oil is made in Provence, its excellence arising from the olives being carefully cleaned and garbled: but what we receive in this country comes from Lucca and Florence. Sicily also furnishes some, but it has a resinous flavour.[1] Good oil has lately been brought from Samos. Much of its goodness depends on the place where the oil is kept: on this account the oil of Gallipoli, which is kept in caverns cut in the rock, is excellent. The oil has been good after seven years in the Gallipolian cisterns. Spanish oil is the worst. Olive oil is imported in jars, half-jars, and what are called half-chests, which are wooden packages containing flasks.[2]

Qualities. — Pure olive oil is an insipid, inodorous, pale, greenish-yellow coloured, viscid fluid; unctuous to the feel; inflammable, incapable of combining with water, and nearly insoluble in alcohol. It is fixed in any temperature under 600°, suffering considerable expansion, but not evaporating; and congeals at 36° of Fahrenheit. It is the lightest of the fixed oils, its specific gravity being 0·9153. When kept for a great length of time, or much exposed to the air, its components are partially separated, sebacic acid is formed, and the oil acquires a disagreeable smell and sharp taste, becomes thick, brown-coloured, and is then said to be rancid, and deposits white globules of stearine.[3] Olive oil is soluble in ether, and slightly in alcohol. The rancidity is hastened by heat, and by the admixture of poppy oil, with which it is often adulterated. The purity of olive oil is readily discovered by adding to twelve parts of the suspected oil one part of a solution of proto-

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[1] This flavour has been ascribed to the Sicilian olives being grown on dry hilly situations. *Galt's Letters from the Levant,* 8vo. p. 129.

[2] 4,158,000 gallons were imported into England in 1831.

[3] Vide *Expressed Oils.*

nitrate of mercury[1], and then shaking them strongly together every ten minutes for two hours, after which the mixture is left at rest. The nitrate solidifies olive oil, but leaves the oils of poppy, of linseed, or of other grains, liquid. This effect is due to the nitrous acid from the mercurial salt forming Elaidin, a very solid fat. It forms soaps with alkalies and metallic oxides. According to Gay Lussac and Thevenot, it is a compound of 77·213 of *carbon*, + 18·360 *hydrogen*, + 9·427 *oxygen*, = 100·000.[2] It consists of margarine and oleine; about 28 of the former to 72 of the latter fat.

Medical properties and uses.—Olive oil is demulcent, relaxant, and laxative. It is used internally as a demulcent in catarrh and other pulmonary affections, diffused in water by means of mucilage; and is also given internally, in large quantities, to mitigate the action of acrid substances, as some poisons, taken into the stomach; and in cases of worms. Externally applied, it is a very useful relaxant, and instead of stopping up the cutaneous exhalants, appears to promote the excretion of sweat; on which account it has been employed with great advantages in frictions in the commencement of plague. The body is ordered to be very briskly rubbed all over with a clean sponge dipped in warm olive oil; copious perspiration generally follows, and the operation must be repeated once a day until symptoms of recovery appear. Mr. Jackson relates that the coolies, who are employed in the oil stores at Tunis, smear themselves all over with oil, and are seldom afflicted with the plague when it rages in that city[3]; an effect which may be owing to the oil forming a coating to the skin, so that it cannot come directly in contact with the contagion. Frictions with it are useful in ascites.[4] It is, however, more generally used as a vehicle for more active substances, in the formation of embrocations: thus, it is an excellent solvent of opium, which can, through its means only, be used in frictions with any advantage.[5] It is also used as an injection in gonorrhœa, and as an adjunct to glysters in dysentery and intestinal abrasions. It is extensively used in pharmacy, in the composition of ointments, cerates, and plasters.

The dose of olive oil is from f ʒ j. to f ℥ ji. triturated with mucilage, or mixed with water by means of a few drops of solution

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[1] This nitrate is prepared by dissolving, without heat, 6 parts of mercury in $\frac{1}{2}$ of nitric acid, sp. gr. 1·38.

[2] *Recherches Phys. Chim.* ii. 326.

[3] *Reflections on the Commerce of the Mediterranean*, p. 64.

[4] Lord Bacon, speaking of inunction, says,—"Ante omnia igitur usum olei vel olivarum vel amygdali dulcis, ad cutem ab extra unguendum, ad longævitatem conducere existimamus." *Opera*, fol. 1665, p. 536.

[5] The nostrum called *Roche's Embrocation*, for hooping-cough, consists of olive oil, with about half its quantity of the oil of cloves and oil of amber.

of potassa. In cases of poisons or of worms, as much may be given as the stomach can bear.

OLEUM AMYGDALÆ. See *Amygdala.*

OLEUM JECORIS ASELLI. See *Morrhua Vulgaris.*

OLEUM MORRHUÆ. See *Morrhua Vulgaris.*

OLEUM RICINI. See *Ricinus.*

OLEUM ROSÆ. See *Rosa.*

OLEUM TEREBINTHINÆ. See *Pinus.*

OPIUM. See *Papaver.*

OPOIDIA GALBANIFERA. See *Galbanum.*

OPOPONAX. *De Candolle.*

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.
G. novum. Fruit elliptical, compressed, flat. *Petals* involute, entire.
Species —. O. *Chironium.*[1] Opoponax, or Rough Parsnep. *Med. Bot. 3d edit.* 122. *t.* 47. *Nees Von Esen.* 292.
OPOPONAX. Not now officinal.

Syn. Opoponax (*F.*), Panax gummi, Opoponax (*G.*), Opoponaco (*I.*), Opopanaco (*S. Port.*), Gawsheer (*Pers.*), Iáwesheer (*Arab.*).

This is a perennial plant, a native of the south of Europe, flowering in July. The root is as thick as the human arm, branched, of a yellow colour, and covered with a tuberose bark: the stem rises about five feet in height, the thickness of a man's finger, round, striated, scariose at the base, angular at the summit, and shining: the lower leaves are simple, cordate, and crenated; those of the stem ternate, and quinate, with the terminal leaflet cordate and very large: the whole are petiolate; the petioles sheathing, and the leaflets hairy on the under-surface; the umbelliferous branches are very smooth; first alternate, erect; then two, three, or four together, in a sort of whorl, two or three inches long, with one or two spathaceous leaflets towards the middle or at the top; the universal umbels have seven or eight rays, an inch long, of a yellowish-green colour: both the involucres and the involucels consist of from four to six very short leaflets, frequently permanent. The fruit is flat.

In the Levant, where this plant grows, the milky juice which

[1] Ὀποπόναξ, Dioscoridis.

exudes from incisions made in the roots, and dried in the sun, forms the opoponax of the shops. That which is obtained from plants grown in France contains scarcely any resin. It is imported from Turkey and India in chests, and is sometimes in tears or drops, but more usually in irregular lumps.

Qualities—Opoponax has a strong, disagreeable smell, and a bitter, acrid taste. The masses are of a reddish-yellow colour, speckled with white on the outside, paler within, and frequently variegated with large white pieces. Its specific gravity is 1·622.[1] It appears to be a compound of *gum* 33·40, *resin* 42, *starch* 4·20, *extractive* 1·60, *wax* ·30, *malic acid* 2·80, a trace of *caoutchouc*, *volatile oil* 5·90, and *woody fibre* 9·80, = 100 parts.[2] When triturated with water, about one half of it dissolves, forming an opaque, milky solution, which deposits on standing a portion of resinous matter, and becomes yellowish. Alcohol acts feebly on it; and in distillation, either with spirit or with water, the odour of the opoponax is very strongly communicated to the fluids, but scarcely any oil is obtained in a separate state.

Medical properties and uses.—This gum-resin is regarded as antispasmodic and emmenagogue, and as such has been used in hysteria and chlorosis; but it is very seldom ordered. The dose may be from grs. x. to ʒ ss.

ORIGANUM. *Spec. Plant. Willd.* iii. 132.

Cl. 14. *Ord.* 1. Didynamia, Gymnospermia. *Nat. ord.* Labiatæ.

G. 1116. *Strobile* four-cornered, spiked, collecting the calices. *Corolla* with the upper lip erect and flat, the under three-parted, with the segments equal.

Species 10. O. *vulgare.* Common Marjoram. *Med. Bot. 3d edit.* 344. *t.* 123. *Smith, Flor. Brit.* 639. *Eng. Bot.* 1143.

Species 15. O. *Majorana.* Sweet Marjoram. *Med. Bot. 3d edit.* 345. *t.* 124.

1. ORIGANUM VULGARE.[3]

Officinal. ORIGANUM, *Edin.* ORIGANUM VULGARE. Common Marjoram herb.

Syn. Origan (*F.*), Gemeiner dosten, Wohlgemuth (*G.*), Moriolein orago (*Dutch*), Meiran (*Dan.*), Vild mairan (*Swed.*), Dosta (*Pol.*), Dushitza obiknovennoi (*Russ.*), Origàno (*I.*), Oregano Sylvestre (*S.*), Mange rona, Ouregão (*Port.*).

This plant is indigenous and perennial, growing on dry, chalky, and gravelly hills, flowering from July to September. The root is creeping and fibrous, sending up erect, branching, trichotomous, tetragonous stems, about eighteen inches in height, downy, and of a purplish hue. The leaves are ovate, entire, somewhat hairy,

[1] *Brisson.* [2] *Pelletier, Ann. de Chimie,* lxix. p. 90.

[3] Σαμψυχον, Dioscoridis.

ciliated, punctured, and of a deep yellowish-green colour. The flowers are in terminal panicles, of a pink-purple or rose colour, and furnished with ovate, sessile, brownish-red bracts. The calyx is tubular, toothed; the segments being nearly equal: the corolla is funnel-shaped, with the upper lip bifid and obtuse, and the under trifid, blunt, and spreading. The filaments are furnished with double anthers, and the style is filiform, with a bifid reflected stigma.

Qualities.— The odour is agreeable and aromatic, and the taste warm and pungent, much resembling thyme. In distillation with water it affords a very acrid, penetrating, volatile oil, on which its qualities depend. It contains, also, *tannic acid* and a *bitter principle.* Its infusion is incompatible with the salts of iron.

Medical properties and uses.—Common marjoram is regarded as tonic, stomachic, and emmenagogue. It was formerly used in debility of the stomach, in chronic coughs and in asthma; but is now neglected. The dose is from grs. x. to ℈j., in powder.

Officinal preparation. — *Oleum Origani*, E.

2. ORIGANUM MAJORANA.[1]

Sweet Marjoram. Not now officinal.

Syn. Marjolaine (*F.*), Majoran (*G.*), Mariolein (*Dutch*), Mejram (*Swed.*), Merian (*Dan.*), Maggiorana (*I.*), Origano, Mejorana (*S.*), Manjerona (*Port.*), Mirzunjoosh (*Arab.*), Marroo (*Tam.*).

This is an annual plant, a native of Portugal and Syria; but cultivated in our gardens for culinary and medicinal purposes, and flowering in July and August. The root is long, brown and fibrous; the stems numerous, woody, branching, and rising a foot and a half in height. The leaves are downy, entire, ovate, petiolate, and of a pale-green colour. The flowers are small, white, appearing successively among the bracts, which are numerous, and form roundish, compact, terminal spikes. The calyx is tubular, five-toothed, with the teeth acute; the corolla funnel-shaped and bilabiate; the upper lip erect and roundish; the lower cut into three-pointed segments.

It is cut for medicinal use when it begins to flower in July.

Qualities. — The odour is pleasant, and the taste moderately warm, bitterish and aromatic. Its properties are not dissipated by drying. Both alcohol and water extract the virtues of sweet marjoram; and, in distillation with water, it yields a large portion of pale-yellow *volatile oil*, which, on being long kept, becomes solid. It contains, also, *tannic acid*, *resin*, and *bitter extractive.*

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[1] Ὀρούγανος Dioscoridis.

Medical properties and uses. — Sweet marjoram is tonic, and was formerly regarded as possessing errhine powers. It is scarcely ever used except as a culinary herb, or as an adjunct to cephalic snuffs, to which, however, it adds no efficacy.

OSSA. *Dub.* Bones of the Ox, or Bos Taurus.

Syn. Des os (*F.*), Knochen (*G.*), Ossi (*I.*), Huesos (*S.*)

The bones of animals consist of earthy salts united with animal matters. The earthy salts are phosphate of lime (bone earth), carbonate of lime, phosphate of magnesia, together with very small quantities of fluoride of calcium and chloride of sodium; the animal matter chiefly consists of gelatin, yielding tissue, with small amounts of albuminous tissues and fatty substances. Fourcroy and Vauquelin give the following analysis of ox bones:— Animal matter 51, phosphate of lime 37·7, carbonate of lime 10, phosphate of magnesia 1·3 = 100. According to Berzelius, dry ox bones consist in 100 parts of gelatinous tissue 33·3, phosphate of lime, with a little fluoride of calcium, 57·35, carbonate of lime 3·85, phosphate of magnesia 2·05, soda, with a little chloride of sodium, 3·45.

Bones are introduced into the Dublin Pharmacopœia for the purpose of yielding phosphoric acid and phosphate of lime in the formation of the Calcis Phosphas precipitatum and Sodæ Phosphas. They are also used in preparing ivory black, and sometimes for preparing a gelatinous compound (portable soup).

OVI ALBUMEN.
OVI VITELLUS. } See *Phasianus Gallus.*

OVIS. *Syst. Nat. Gmelin.* i. 197.

D. 1. Vertebrata. Cl. 1. Mammalia. *Ord.* 7. Ruminantia. *Cuvier.*
G. 31. *Horns* concave, rough, inclined outwards, and spirally twisted. *Cutting Teeth* eight in the lower jaw. *Tusks* none.
Species 1. O. *Aries.*[1] The Sheep. *Buffon, Hist. Nat.* v. *p.* 1. *t.* 1, 2.
Officinal. SEVUM, *Lond. Edin.* Mutton suet.

Syn. Suif de Mouton (*F.*), Hammeltag (*G.*), Grasse duro, Sero (*I.*), Grassa, Sebo (*S.*), Sebo (*Port.*), Fartalg (*Swed.*). Faurctalg (*Dan.*), Aatoo kalupoo (*Tam.*), Lemac (*Malay*), Elloomusstail (*Cing.*), Addjavuppa (*Sans.*).

The sheep is too well known to require any description. It is supposed to be the domesticated descendant of the *Mouflen,* an animal dwelling in the mountains of Corsica, Sardinia, and the Grecian

[1] Προβατειον, *Aristot. Hist. Animal.* v. cap. 11.

Archipelago. This opinion, although doubtful, yet is more probable than that which refers it to the *Argali* of Siberia. It is an inhabitant of almost every climate, and delights in dry, saline, moderately elevated, and warm pastures. It is the most innocent, simple, and timid of quadrupeds; scarcely ever living beyond fourteen years of age; yet liable to many diseases. There are several natural varieties of the sheep in the British Islands, the largest of which is found in Lincolnshire, and the smallest in Zetland; and the number of these is much increasing by the cross breeds, which, for the improvement of the wool and flesh, are annually effected. Mutton is less dense than beef, very digestible and wholesome, and is at its greatest perfection when about five years old. It is very much improved by the castration of the animal, and is then called wether-mutton. The broth made of it does not agree so well as light beef-tea, or veal-tea, with delicate and weakened stomachs: but it forms an excellent emollient enema, in cases of ulceration, or abrasion of the rectum, and that state of the bowels of infants which occasions green stools and apthæ.[1] The suet, which is the officinal part of the animal, is chiefly obtained from about the kidneys and loins.

Qualities. — Suet is the most consistent of the real animal fats. It is white, has some degree of brittleness, is inodorous, and requires a temperature of 127° Fahrenheit to melt it. The constituents of suet are *stearine, oleine,* and *margarine.* In most respects it agrees with all animal fats. (See the qualities of fat under *Sus scrofa.*)

Medical properties and uses. — Like the other fats, suet is emollient. It is sometimes boiled in milk, in the proportion of ℥ ij. of the suet to O j. of milk; and a cupful of the mixture may be administered in chronic diarrhœa, when there is much acrimony of the contents of the bowels; but its principal use is to give consistence to ointments and plasters.

OVUM. See *Phasianus.*

OXALIS.[2] *Spec. Plant. Willd.* ii. 772.

Cl. 10. *Ord.* 5. Decandria Pentagynia. *Nat. ord.* Oxalideæ.

G. 918. *Calyx* five-leaved. *Petals* connected by claws. *Stamens* unequal, the five shorter exterior ones connected at the base. *Capsules* opening at the corners, five-cornered.

*** *Leaves ternate, scape one-flowered.*

Species 25. O. *Acetosella.* Wood-sorrel. *Med. Bot. 2d edit.* 563.

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[1] The milk of the ewe is seldom used either as aliment or medicine. It contains more cream and less whey than cow's milk, but the butter yielded by it never acquires a proper consistence. It is made into cheese in Scotland, which is bitterish; and, when old, it is warm, biting, and resembling Parmesan cheese in flavour.

[2] Οξαλις Dioscoridis.

t. 201. *Smith, Flor. Brit.* 491. *Jacquin's Oxalis,* 114. *t.* 80. *f.* 1. *Lindley's Synopsis,* 59. *Hayne,* v. 39.
Officinal in Lond. Pharm. 1836, now omitted.

Syn. Oseille des Bucherons, Alleluia (*F.*), Sauerklee (*G.*), Zuurklaver, Klaverzuuring (*Dutch*), Skovsyne (*Dan.*), Harsyra (*Swed.*), Szczawik (*Polish*), Saitschartscharvl (*Russ.*), Luggiola Acetosa salvatica, Alleluja (*I.*), Oxalide acederilla (*S.*), Trezo azedo (*Port.*).

This is an indigenous perennial plant, found in woods, under hedges, and other shaded places, and flowering in April and May; the root is horizontal, toothed, fleshy, and of a reddish colour. The leaves all spring from a compressed stem; they are ternate like the trefoil, and petiolate; with the leaflets obcordate, very entire, hairy, of a yellowish-green colour, and purplish underneath. The scape or flower-stalk is furnished with two scaly bracts, placed about an inch and a half beneath the flower, which is subnutant, delicate, and of a flesh-colour streaked with red. The calycine leaflets are oblong, oval, acute, ciliated, and purple at the tip. The corolla is bell-shaped; with the claws of the petals upright, and the borders obovate, rounded, and spreading: the filaments are somewhat connate at the base, and furnished with oblong, incumbent anthers; and the styles smooth, rising from an ovate germen. The capsule is membranous, and contains two seeds in every cell. Each seed is invested with a fleshy white tegument, resembling an aril, which is, at first, smooth and closed on every side, but at length, opening at the apex elastically, it rolls back and throws off the seed with considerable force.[1]

Qualities. — This plant is inodorous, and has a pleasant acidulous taste. The expressed juice reddens vegetable blues, coagulates milk, and instantly precipitates lime from its solutions. Its active principle is *quadroxalate of potassa,* which is obtained crystallized from the expressed juice, and sold in the shops under the name of *Essential salt of lemons.*[2] The same salt may be formed by cautiously dropping a solution of potassa into a saturated solution of oxalic acid, and when it is neutralized adding three parts more of the acid.[3] Formula $K\,O,\,4\,C_2\,O_3 + 7\,H\,O$. It crystallizes in small modified octahedrons.

Medical properties and uses.—Wood-sorrell is refrigerant and antiseptic. Boiled in milk it forms a pleasant whey, which may prove a useful refrigerant in fevers, as may also the expressed juice,

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[1] *Gærtner de Fructibus,* ii. 152. t. 113. fig. 5.

[2] This salt is prepared on the Continent by the following process: — The juice is allowed to subside after being slightly heated, and then clarified by adding to it water, in which a small portion of fine clay is suspended. This clarified juice is next boiled till a pellicle forms on its surface, and put aside for a month to crystallize; the operation being repeated until the whole of the salt is obtained, when it is purified by a second crystallization. — *Annales de Chimie,* xiv. 7. The essential salt of lemon of the shops is generally one half bitartrate of potassa.

[3] *Crell's Annals* (trans.), i. 107.

or the quadroxalate obtained from it diluted with water: but although they are much extolled in inflammatory, bilious, and putrid cases, by the Continental physicians, yet their place is well and easily supplied by lemon-juice, or the citric acid, dissolved in water. The recent herb, eaten as a salad, may be serviceable in scorbutic affections.

PANIS. See *Triticum.*

PAPAVER. *Spec. Plant. Willd.* ii. 1144.

Cl. 13. *Ord.* 1. Polyandria Monogynia. *Nat. ord.* Papaveraceæ.
G. 1015. *Corolla* four-petalled. *Calyx* two sepals. *Capsule* one-celled, opening by pores under the persistent stigma.
** *With smooth capsules.*
Sp. 5. P. *Rhœas.* Corn or Red Poppy. *Med. Bot. 3d edit.* 387. *t.* 139. *Smith, Flora Brit.* 567. *Eng. Bot.* 645.
Sp. 7. P. *somniferum.* White Poppy. *Med. Bot. 3d edit.* 376. *t.* 138. *Smith, Flora Brit.* 568. *Haynes,* vi. 40. Nees von Esenbeck, 404, 405.[1]

1. PAPAVER RHŒAS.[2]

Officinal. RHŒAS, *Lond. Edin. Dub.* Petals of the Corn or Red Poppy. Papaver Rhœas (fresh, *L.*).

Syn. Coquelicot (*F.*), Klappenrose, Wilde Mohn (*G.*), Klapperroos (*Dutch*), Klapperrose (*Dan.*), Kornros (*Swed.*), Papavero rosolaccio (*I.*), Adormidera sylvestre, Amapola (*S.*), Papoileira (*Port.*)

This species of the poppy is an indigenous annual, growing in the greatest abundance in corn-fields and waste places, and flowering in June and July. Its geographic situation extends from 60° N. lat. towards the tropics; but it is not found in America. The stem rises about a foot in height, is branched, and everywhere furnished with stiffish horizontally spreading hairs. The leaves are sessile, pinnatifid, sometimes doubly so, serrated or cut, and generally hairy. The flowers are solitary, on slender, hairy peduncles; the calyx consists of two ovate, rough, concave leaves, which fall before the petals expand: the petals are four, large, roundish, unequal, and spreading, of a full, bright, scarlet colour, and sometimes marked with a black spot at the base. The germen is ovate, smooth, with a convex, sessile, shield-like stigma, scalloped on the edge, having many purple-coloured rays; and becomes an urn-shaped capsule.[3]

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[1] The Papaver *officinale* of Nees von E., Dr. Lindley justly regards as a variety of the P. *somniferum.* — *Flora Med.* 15.
[2] Ῥοιας Theophrasti et Dioscoridis.
[3] This form of capsule easily distinguishes it from Papaver *dubium,* which has a long, slender capsule, but in other respects closely resembles the corn poppy.

The petals must be gathered when they begin to blow, as they very soon drop after they are fully expanded.

Qualities. — They have a faint, narcotic odour, and a mucilaginous very slightly bitter taste. They yield their colouring matter to warm water; and on this account only are used, as they cannot be said to possess any narcotic properties. The capsules, however, of every species of poppy contain opium; and from the red poppy, it has actually been procured for medicinal purposes, both by Boulduc[1] and Dr. Alston[2]; but the quantity is too small to make it an object of importance.

Officinal preparation.— *Syrupus Rhoeados,* L. E.

2. PAPAVER SOMNIFERUM.[3]

Officinal. OPIUM, PAPAVER, *Lond. Edin. Dub.* Poppy capsules or heads (not quite ripe, *E.*), and Opium, or the concrete juice from the unripe Capsules of Papaver Somniferum.

Syn. Capsules des Pavots blancs; Opium (*F.*), die Köpse des Weissen Mohns, Mohnsaft (*G.*), Wittamnu Hewl, Turks Heulzap (*Dutch*), Velmuesaft (*Danish*), Wallmo Opion (*Swedish & Russian*), Capi del Papavero; Oppio (*I.*), Adormideras; Opio (*S.*), Ufyoon (*Arab.*), Affion (*Turkish*), Afiun (*H.*), Iya-Peen, Afooyung (*Chinese*), Apini (*Tam.*), Ufyoon (*Malay*), Afeoon; Zire-ank; Abeoon; Sheer-khushah (*Pers.*), Abim (*Cing.*), Apium (*Jav.*), Caruppa (*Malab.*).

The somniferous or white poppy is a native of Asia; and although it is found growing wild in the southern parts of Europe, yet there is every reason for thinking that its seed must have been carried to these parts. It was very early cultivated in Greece, perhaps, at first, solely for the sake of its seed, which was used as food: and there is some reason for supposing that the Arabians and Persians procured it from the Greeks. It is cultivated in many of the states of Europe[4], and extensively in Asia in the present age, not

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[1] *Mém. de l'Acad. de Paris*, 1712. [2] *Alston's Mat. Med.*

[3] Μηκων ἥμερος Theophrasti et Dioscoridis. Homer notices the somniferous poppy, under the name of μηκων, as a garden plant: and it is said to be nourishing by Hippocrates; an expression which is explained by the fact that, at this day, in Persia, when the plants rise too thick in the fields in which they are sown, those which are taken up, when they are young, are used as pot-herbs. The following are the names by which the poppy is known in the greater part of Europe: — *Pavot de jardin* (F.), *Papavero domestico* (I.), *Mohn, Garten Mohn, Magen* (G.), *Dor midera, Cascak* (S.), *Mák* (Boh. & Hung.), *Maczek* (Polish), *Maan* (Flemish), *Valmue* (Danish). In Asia its appellations are *Khashhash* (Arab.), *Oūg sōk, Kooknan* (Pers.), *Casa Casa* (Tam.), *Post* (Sans.). *Post* (Hind.), *Albin Atta* (Cing.) *Ying-suh* (Chinese), *Keis, Reisjun jeisoku* (Japan).

[4] In England, it has been cultivated for the purpose of obtaining opium. Mr. Ball, in 1796, received a premium from the Society for the Encouragement of Arts, for a specimen of British opium little inferior to the Oriental. — *Transactions of the Society of Arts*, xiv. 260—270.

My friend, Mr. Lawes, of Rothamstead Park, near Harpenden, Hertfordshire, raised some opium in 1836 equal to any Turkey which I have ever examined. It is, however, improbable that opium will ever be made in large quantities in England.

only on account of the opium, for which it is reared in Persia and India, but also on account of the capsules, and especially for the bland oil obtained from the seeds. It is an annual plant, flowering in June and July, in Europe; and in February, in India. The stem is glaucous, smooth, erect, and round; rising to the height of three or four, occasionally five, feet, when in a favourable situation. The leaves are large, simple, obtuse, slashed, and bluntly toothed; amplexunule, and alternate. The flowers are large and terminal; the calyx is formed of two smooth, ovate, concave sepals, that drop on the expanding of the petals: which are four in number, large, roundish, entire, somewhat undulated, and white; occasionally lilac, and tinged, but not always, with a violet spot at the base. The filaments are very numerous, slender, shorter than the corolla, hypogenous, and support erect compressed anthers; and the germen, which is globular and smooth, is crowned with a many-rayed stigma. The capsule, which stands on a short pedicel, is obovate or globular when well grown, smooth, glaucous, from two to four inches in diameter, a little flattened at the top and bottom, and crowned with the persistent stigma, the segments of which stand erect, and have an elegant appearance. The seeds are small, white, or grey, reniform, and very numerous; and escape, when ripe, through small openings under the points of the stigma. When the plant is burnt, the ashes contain 7 per cent. of carbonate of potassa, 22 chloride of potassium, 20 sulphate of potassa, and 51 of insoluble matter.

All the parts of the poppy, except the seeds [1], contain a white, opaque, narcotic juice; but it abounds more in the capsules: hence these are the only officinal parts of the plant, and for them chiefly is the plant cultivated in this country. They are gathered as they ripen; and as this happens at different times, there are annually three or four gatherings. It would be better, however, as the Edinburgh College directs, to gather them whilst they are yet green, in which state they contain more proper juice than when ripe. They are brought to market in bags, each bag containing about 3000 capsules, and are sold to the druggists.[2]

The milky juice of the poppy, in its more perfect state, is extracted by incisions made in the capsules, and inspissated: and in this state it forms the opium of commerce.[3] The period for com-

[1] The seeds are not narcotic, but alimentary; hence the appellations *almum, cereale, vescum,* given to the poppy by the ancient poets. They yield by pressure a bland oil, somewhat resembling olive oil.

[2] The London market is chiefly supplied from Mitcham in Surrey. — *Stevenson's Survey,* 382.

[3] In tracing the origin of the name *Opium,* we find that the ancient inhabitants of India and of Egypt, and the Arabians, called the inspissated juice of the capsule of the poppy, *affion;* the Persians, *afiuun,* or *abé-oon;* the Moors, *affiun;* and by the modern Turks it is termed *affioni.* The Greeks named it *opion,* a word derived from *opos,* a juice. Οπιον απο του οπου, adding sometimes, *μηκωνος,* the juice of the poppy, or *οπος των κωθειων,* the juice of the capsule. Some suppose that the Nepenthes of

mencing this operation is from seven to twelve days after the petals fall and the capsule assumes a whitish hue. The mode of obtaining it appears to have been nearly the same in the time of Dioscorides as it is at this day. The plants, which should be six inches apart during their growth, are carefully watered and manured, the watering being more profuse as the period of flowering approaches, and until the capsules are half grown, when it is discontinued, and the collection of the opium commences. At sunset, longitudinal incisions are made upon each half-ripe capsule [1], with an instrument which is called *nahrea* in India, and which has five sharp points. The incisions are made obliquely from below upwards, and do not penetrate to the internal cavity. The night dews favour the exudation of the juice, which is collected in the morning, before the dew is dispersed, by old women and children, who scrape it from off the wounds with a small iron scoop, and deposit the whole in an earthen pot [2], where it is worked by wooden spatulas in the sunshine, until it attains a considerable degree of spissitude. The collection is repeated every second day for a fortnight or three weeks. The whole of the collections are then formed by the hand into cakes, which are laid in earthen basins to be further exsiccated, when it is covered over with poppy or tobacco leaves.[3] Such is the mode followed in India, and according to Kœmpfer's account nearly the same is practised in Persia [4]: in China, in the province of Chĕkeäng, the poppy is cultivated and opium made in the same manner: and when the juice is drawn in a similar manner in this country, and inspissated, it has all the characters of pure opium.[5]

Homer (Odyssey, iv. 220. v.) was opium; but this opinion is disproved by Dr. Christen, in his excellent work entitled, *Opium Historice, Chemice, atque Pharmacologice Investigatum.* Vindobonæ, 8vo. 1820.

[1] In India, the incisions are made in the capsules not later than seven days after the petals fall, when the capsule begins to harden.

[2] In some parts it is collected in a small brass pot, or a cocoa-nut shell, containing a little linseed oil.

[3] *Med. Observ. and Inquiries*, v. 317.

[4] According to Kœmpfer, the produce of the first incisions is of a pale yellow, and called *gobaar* in Persia; and is esteemed much superior in strength and goodness, in every respect, to the other collections.

[5] When a current of wind or a cloudy day prevents the formation of dew, the incisions of the scarifications in the capsule are closed, and little juice flows. On the contrary, when the dew is heavy, and the flow of sap great, the opium is apt to fall off and drop from the incisions, and be wasted. In moderate dews the quantity of opium is greatest, namely, gr. j. of solid opium from each quadruple incision; it is exteriorly *rose red*, interiorly *reddish white*. When the dew is considerable, it also does harm by separating the soluble from the insoluble parts of the opium. The scrapers are, in Malwa, dipped in oil to prevent such an effect, but it injures the flavour of the opium. When water is used for this purpose, a dark reddish or blackish brown solution takes place, which evaporates into what is termed Pasewà in Bengal; it is either mixed with the mass of opium, or used as lé wá, or paste, with the petals to cover the opium.

When opium has been rapidly dried in the shade, it has a coppery or reddish-brown colour; is translucent in thin plates, with a gallstone *yellow* colour, and slightly granular texture. It has considerable adhesiveness; its odour is heavy, narcotic, but not unpleasant. In this condition it is termed *standard* or *awwal* opium in Bengal. When it

No plant has its produce, both as to quality and quantity, so much modified by soil and culture as the poppy.

Opium is brought to this country in chests from Turkey and Persia, Egypt and India.[1]

Turkey opium is raised in Anatolia, and exported chiefly from Smyrna and Constantinople. It is in roundish flat pieces or cakes, covered with leaves, and the reddish capsules of some species of *Rumex*, which is considered an indication of its goodness, as the inferior kinds of opium have none of these capsules adhering to them. Turkey opium generally contains about one fourth part of impurities. That variety of Turkey opium, known in the market by the name of *Smyrna opium*, which is in lumps weighing from ℔ss. to ℔iij., is usually of superior quality. The lumps are soft, ductile, adhesive; and when torn asunder, present a stringy fracture of a pale-brown colour. When it is harder, of a brownish-black colour, it is of inferior quality. Another kind of Turkey opium is called *Constantinople opium*, very similar in character to the above; but a very inferior kind also passes under this name, occurring in small flattened pieces, about three or four ounces in weight, and inclosed in a poppy leaf, the impression of the mid-rib being left on its surface.

East Indian opium is raised chiefly in Malwah, in Behar, Patna, and Benares. There are four varieties of it, but the whole goes under the name of Bengal opium. Little of it, except as matter of private speculation, is brought to Europe. The best is in square cakes, about four inches in diameter and half an inch thick, packed in boxes, containing the opium in cases of bees' wax, with interposed plates of mica. This is the *Garden-Patna opium* of India. A second kind, called *Malwah opium*, is in round flat masses, covered with the petals of the poppy in successive layers, to the thickness nearly of one fourth of an inch. A thick kind is called *Chinese Investment opium:* it occurs in cakes or balls, about the size of 24 lb. cannon balls, and weighing about 4 lbs.; it is covered with a thick coating of poppy leaves and petals, agglutinated together by means of inferior opium. East India opium is often adulterated with *sand;* sometimes with *clayey mud;* and *sugar*, or *gur*, *coarse molasses.* Mr. Kerr relates, that at Behar it is, also, adulterated with cow-dung, the extract of the poppy procured by boiling, and various other substances. In Malwah [2], where the

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has been inspissated slowly in deep hollow vessels, it consists of irregular granules, or nodules, and is termed raw or *kacha* opium. The amount of opium obtained from any given quantity of land must vary. In Hindostan it is stated to be between forty and sixty pounds per acre.

[1] The Turkey opium is, nevertheless, the produce of Persia. The India opium was for a long time regarded as the best; but the Persian, or Turkey opium, as it is called, is now justly preferred.

[2] In Malwah about 350,000 pounds, avoirdupois weight, of opium, are annually

greatest quantity is raised, it is mixed with oil of Sesamum, which is often one half of the mass: ashes, the dried leaves of the plant, and catechu are also used. It is also adulterated with the aqueous extract of the capsules, the extracts of Chelidonium *majus*, Lactuca *virosa*, and Glycyrrhiza *glabra*; and sometimes with gum arabic, tragacanth, aloes, and many other articles. Great pains, however, have lately been taken by Dr. Adams of Calcutta in improving the preparation of East Indian opium; and, except in point of strength, it is equal to the best Turkey opium.

Egyptian opium occurs in roundish flattened cakes, varying in size, being from about one ounce to half-a-pound, or even a pound in weight; it is generally partly covered by leaves, which, however, become worn off by the friction of the pieces amongst each other; the leaves appear to be those of the poppy, and not of the rumex. This kind of opium is hard, rather brittle, and of a dark reddish colour; its odour is musty and narcotic, and by no means so agreeable as that of the Turkey opium.

Opium is regarded as bad, when it is either very soft, greasy, light, friable, of an intensely black colour, or mixed with many impurities: if it has a weak or empyreumatic odour, an only slightly bitter or acrid, or a sweetish taste, or the power of marking a brown or black continuous streak when drawn across paper, these are also symptoms of inferior opium.

Qualities.—1. *The dried, ripe capsule* of the poppy is inodorous, and nearly insipid, a slight degree of bitterness only being perceptible when it is long chewed. Water by boiling extracts its virtues; and when the decoction is evaporated, an extract is obtained, with properties similar to opium, but much less powerful.

1. *Turkey opium* (*Smyrna opium*) is the best description of opium imported into this country. It has a peculiar, strong, heavy, narcotic odour, and a bitter taste, which is accompanied with a sensation of acrid heat, or biting on the tongue and lips, if it be well chewed; and if long kept in the mouth of a person unaccustomed to chew it, blistering is produced. Its colour, when good, is a reddish-brown, or hair-brown; its texture compact and uniform. Its specific gravity is 1·336. When soft, it is ductile and tenacious; but when long exposed to the air, it loses one sixth of its weight and becomes hard, breaks with a uniform, shining fracture, is pulverulent, and affords a yellowish-brown powder; which is again aggregated by a heat as low as that of the hand. It is inflammable, and partially soluble in water, vinegar, lemon-juice, wine, alcohol, and ether. By long boiling in water under exposure to the air, its narcotic powers are impaired; yet nothing rises with

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produced, 210,000 of which are for exportation.—*Malcolm's Mem. on Central India*, vol. i. p. 8.

water, when it is distilled with that fluid.[1] When carefully triturated with distilled water, it gives solutions of various specific gravity; thus ℥ viij. of one specimen rubbed down with two pints of water, yielded a solution of sp. gr. 1·039; of another specimen, a solution of sp. gr. 1·038 was procured; whilst the same quantity of Egyptian opium afforded a solution of sp. gr. 1·052; yet this yielded less Morphia than either of the former specimens. When treated with hot water, about five parts in twelve of the opium are dissolved and retained in solution, nearly six parts are simply suspended, and rather more than one part remains perfectly insoluble: the last is of a viscid, plastic nature, somewhat resembling the gluten of wheat, but of a dark colour. Bucholz regarded this as caoutchouc; according to Proust it contains wax, and Gren supposed it to be analogous to gluten. By digesting alcohol on this substance, I found that it dissolved a small portion of it, acquired a reddish-yellow colour, and became milky when added to water. Sulphuric ether digested on it, broke it down, and dissolved a portion of it, forming a yellowish tincture, which, when evaporated on water left resin, a bitter extractive, and some acicular crystals of narcotina. The insoluble part, after the action of the ether, was subjected to a set of comparative experiments with the gluten of wheat, when it afforded similar results with the majority of the tests employed. Hence this part of Turkey opium appears to be a modification of gluten, combined with resin, extractive, and peculiar salts. The aqueous solution of Turkey opium is precipitated by the chloride of barium, the alkalies, the carbonates of potassa and of soda, by ammonia, the acetate and diacetate of lead; by the bichloride and nitrate of silver, sulphates of copper, zinc, and iron; by iodine and its tincture; lime water, and every astringent vegetable infusion or decoction.

2. *Persian opium* is in cylinders about the thickness of the finger, and six inches long. It is soft, flexible, and has a granular texture. Its solution resembles that of the East Indian opium, and it is similarly affected by reagents.[2]

3. *East Indian opium* has a strong, empyreumatic smell, but not much of the peculiar, narcotic, heavy odour of the Turkey opium. The taste is more bitter, and equally nauseous, but it has less acrimony. It agrees with the Turkey opium in its other sensible qualities, except that its colour is blacker, and its texture less plastic, although it is as tenacious. It is more friable, and when triturated with water no insoluble plastic residue is left, but it is altogether taken up; eight parts in twelve being dissolved, and the remainder suspended in the fluid. Very little of it is brought to England,

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[1] Beaumé, however, asserts that the odorous part of the opium is an oil.

[2] This opium is *made* at Yezd and Kain in Persia: the sticks are about the size of those of sealing wax, and brittle.

its consumption being confined to China and other oriental countries.

The aqueous solutions of *East Indian opium* are transparent when filtered, and of a deep brown colour; they redden litmus paper; are not decomposed by alcohol, but precipitated by solution and tincture of iodine, the carbonates of potassa and of soda, by pure ammonia, and by chloride of barium: precipitates are also formed by solutions of the bichloride and nitrate of mercury, the acetate and diacetate of lead, the nitrate of silver, the sulphates of copper, of zinc, and of iron: by infusion of galls and all astringent vegetable infusions. Acetate of baryta produces a copious precipitate with the solution of East Indian opium: oxalic acid, also, precipitates it copiously.

Egyptian opium is usually very dry, and has a redder colour than any of the other varieties, a circumstance which depends on the existence of a meconate of iron in it, probably owing to iron spatulas being employed in making it up. On this account, although it contains an adequate proportion of morphia, yet it is difficult to procure that salt in a pure state from it. Its solution is precipitated by the same reagents which precipitate the solution of Turkey opium.

English opium resembles Egyptian opium in many particulars; but it is never found in the market; and, therefore, it is not necessary to enter into details respecting its solution. That specimen which I have already mentioned as having been made by my friend Mr. Lawes, at Rothamstead, was equal to the best Turkey opium; and its solution was affected in a similar manner by the same reagents.

No article of the Materia Medica has occupied the attention of chemists so much as opium.

According to Bucholz, the proportion of *extractive*, in 100 parts of opium, is 35·6; of *gum*, 30·4; of *resin*, 9; *gluten*, 11·4; *substance like caoutchouc*, 4·8; *sulphate of potassa*, 2; and of *sulphate of lime*, 1; the remainder cosisting of an oily or *balsamic matter* and *waste*.[1] Little more was known of opium for a long period, except that it contained *gum*, *resin*, *extractive*, and an *oily matter*, *gluten*, and *salts of lime* and *potassa*, but, as its narcotic power evidently could not depend on any of the above-named principles, some others were to be looked for, and were at length discovered. Derosne, in 1803, asserted that the activity of opium depended on a peculiar salt.[2] He evaporated a watery infusion of opium to the consistence of syrup, and digested the residue of this evaporation in hot alcohol: as the solution cooled, a salt formed, which, by repeated solutions and crystallizations, was obtained free from the resin, of a white colour, and in rectangular prisms with rhomboidal

[1] *Tromsdorff's Journ.* viii. § 24.

[2] *Ann. de Chim.* xiv. 257.

bases: these were inodorous, insipid, insoluble in cold water, but soluble in 400 parts of boiling water; soluble in 100 parts of cold, and 24 of boiling alcohol: very soluble in hot ether and in the volatile oils, but separating as these fluids cooled; soluble also in all the acids, but insoluble in the alkalies. Given to dogs, it produced the effects of a strong dose of opium; but these were readily relieved by vinegar. In repeating the experiments of Derosne, I obtained a much greater proportion of crystals of this peculiar salt from East Indian than from Turkey opium, which I conceived to militate against his idea of its being the sedative principle, inasmuch as larger doses of that variety of opium than of the Turkey are required to produce a narcotic effect on the animal system. I had then no opportunities of ascertaining the power of this salt; but some experiments by M. Orfila[1] demonstrated that, although it exerts a deleterious effect on the animal economy, yet that the symptoms differ from those produced by opium; and even from Derosne's account, it is not so powerful a narcotic as opium itself.[2] My scepticism on this subject was further confirmed by the discovery of M. Sertürner, of Eimbeck, in Hanover. The first experiments of this chemist were made public about a year after those of Derosne; but they excited little attention until he published a second memoir in 1817. Sertürner asserted that the salt of Derosne was not the narcotic principle of opium; that principle being, according to him, an alkaline salt, which is combined with a peculiar acid in opium, and which he had obtained in a separate state. This salt he named *morphium*, and the acid he named *meconic*.[3] Robiquet confirmed the statements of Sertürner regarding the existence of *morphia*[4]; and its narcotic properties are now generally known. This drug has been analysed by many chemists, and no substance has so well repaid the trouble of examination. The following are the ingredients which, up to the present time, have been found in it:—

Alkaloids and allied nitrogenized principles - - - -	1. Morphia. 2. Codeia. 3. Thebæia, or Paramorphia. 4. Papaverina. 5. Narcotine. 6. Narceine.

[1] *Nouveau Journ. de Méd.* tom. x. p. 154.

[2] *Annales de Chimie*, lxv. 270.

[3] *Tromsdorff's Journ.* 1806, Bd. xiv. l. 8. 47. Mr. Donaldson, surgeon, Stonehaven, is of opinion that the magisterium opii of Dan. Ludwig, noticed in his *Dissertationes de Pharmacia*, the second edition of which was published in 1688, was morphia. It was obtained by dissolving the opium in an acid, and precipitating by an alkali.—*Edin. Journ. of Med. Science*, vol. i. p. 476. Vauquelin has claimed the discovery of morphia and meconic acid for Seguin, who read a paper to the French Institute, on the salt of opium, in 1804; but Sertürner, who made his discovery at the same time, went farther than Seguin.

[4] *Annales de Chimie et de Phys.* t. v. p. 276.

Non-nitrogenized principles -	7. Meconine. 8. Porphyroxine.
Acids - - - - - -	9. Meconic acid with a little Sulphuric.

Together with non-crystallizable substances; such as *resins, gums, mucus, caoutchouc, extractives, salts,* and *insoluble matters* and *impurities.*

1. *Morphia.* To procure this alkaloid, Sertürner precipitated a watery solution of opium by ammonia, dissolved the precipitate in diluted sulphuric acid, precipitated this sulphate again by ammonia, and then boiled the last precipitate in alcohol, and crystallized. Robiquet obtained morphia by making a concentrated solution of opium, which he boiled for a quarter of an hour with a small quantity of magnesia. A greyish precipitate forms, which is to be separated by filtration, washed on the filter with cold water, dried, and then digested for some time with weak spirit, in a moderate heat, in order to separate the colouring matter. The residue is now again to be separated by the filter, washed with a little cold alcohol, and then boiled in a larger quantity of rectified alcohol: on filtering the solution whilst it is yet boiling, morphia, beautifully crystallized, and almost free from colour, is deposited as it cools. By repeating the last part of the operation three or four times, with the residue of the previous boilings, the whole of the morphia is obtained. Many other processes have been devised which it is unnecessary to detail; the alkaloid can readily be obtained from its salts by precipitation with ammonia.

Morphia, when it is pure, is colourless, bitter, inodorous, and crystallized in six-sided short prisms, or right-rhombic prisms, with dihedral summits. It is inflammable, leaving a carbonaceous residue; restores, like the alkalies, the colour of reddened litmus paper, browns turmeric paper, and readily combines with acids, forming neutral salts. It is nearly insoluble in cold, not very soluble in hot, water. It requires 40 parts of cold alcohol, and 30 parts of boiling alcohol for its solution, the salt being again precipitated in crystals as the solution cools. It is soluble in oil, both fixed and volatile, and also in the fixed alkalies. It is nearly insoluble in ether. Its formula is $C_{35}\ H_{20}\ NO_6$.

Morphia can be recognised by the above named properties, together with the following reactions: it strikes red with nitric acid, and a deep blue colour with a neutral persalt of iron; it also possesses the property of decomposing iodic acid, and liberating iodine, which can be then tested with starch; again, recently prepared chlorine added, and afterwards ammonia, to a salt of morphia, produces a brown colour, which disappears on the addition of more chlorine; lastly, although morphia is at first

precipitated by potassa, yet by excess of this reagent it is redissolved.

In repeating Sertürner and Robiquet's experiments, I obtained from good *Turkey* opium nearly three times the quantity of morphia yielded by the same weight of *East Indian* opium; which accounts for the fact which has been stated above, that much larger doses of the East Indian than of Turkey opium are required to produce its sedative effect on the system.[1] From opium made in Hertfordshire, I procured 9·5 per cent. of morphia; but, from the opium of the purple poppy cultivated in Germany, Biltz procured 20, and Caventou from French opium 28 per cent. Mr. Brande procured a larger quantity of morphia from a carefully prepared sample of English opium than from the same weight of Turkey opium.[2]

Morphia, being scarcely soluble in water or in the fluids of the stomach in its uncombined state, does not display in a striking manner its properties when it is administered alone; hence for medicinal use it is combined with acids, forming the *acetate*, the *citrate*, the *hydrochlorate*, *sulphate*, *nitrate*, *phosphate*, *tartrates*, and *hydriodate of morphia*. It exists naturally in opium in a state of combination as a bi-meconate; the acetate and hydrochlorate only are officinal. (See PREPARATIONS, Part III.)

2. *Codeia* crystallizes along with hydrochlorate of morphia, in making that salt, in proportions according to the character of the opium. Dr. Christison procured one-twelfth of hydrochlorate of codeia from a specimen of East Indian opium; Dr. Gregory one-thirtieth from Turkey opium. Pure codeia is in octohedrons: water at 60° dissolves 1·26 per cent., at 110° the per centage is 3·7, and at 212° it is 5·9. Codeia dissolves in ether: its solutions are alkaline; it combines with acids, forming crystallizable salts. Its formula is $C_{36}\ H_{21}\ N\ O_6$ (Dr. Anderson). Its crystals from a watery solution, contain 2 equivalents of water. It is distinguished from morphia by its solubility in ether, by not being reddened by nitric, nor made blue by a persalt of iron, and not decomposing iodic acid. Lastly, it is not soluble in excess of caustic potassa, by which means it can be separated from morphia. Codeia forms salts much resembling the corresponding salts of morphia.

3. *Thebaeia* or *Paramorphia.*—An alkaloid, whose properties are but little known. It is distinguished from morphia by its insolubility in potassa, not being reddened by nitric acid, nor made blue by persalt of iron; and from codeia it may be known by its not occurring in large crystals, and not forming crystallizable salts. Formula, $C_{25}\ H_{14}\ N\ O_3$. (Kane.)

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[1] Samples of East India opium have nevertheless yielded nearly as much morphia as is usually found in Turkey opium.

[2] *Manuel*, p. 128.

4. *Papaverina.*—An alkaloid recently discovered by Merck. Its characteristic properties are as follows: it crystallizes in needles; insoluble in water; little soluble in alcohol or ether; more soin the sefluids, when boiling: with acids it forms salts but little soluble; the hydrochlorate crystallizes very readily in beautiful prisms, having a high refractive power, and is very little soluble in dilute hydrochloric acid. Its formula is C_{40} H_{21} N O_8.

5. *Narcotine* may be readily procured by acting on the residue of opium, exhausted by water, with acetic acid, filtering, and precipitating the solution by liquor potassæ. This precipitate, well-washed, and treated with boiling alcohol, yields crystallized narcotine, which may be purified by re-solution in alcohol and treating it with animal charcoal. When pure, it is colourless, tasteless, inodorous, and crystallizes in flexible, acicular crystals: insoluble in cold water, but soluble in 400 parts of boiling water. It requires for its solution 100 parts of cold alcohol, and 24 of boiling alcohol. It dissolves very freely in ether, and in the fixed and volatile oils. It combines, but slightly, with acids, and forms very bitter salts, easily decomposed. It is readily distinguished from morphia by sinking into heated paper like resin, by not reddening nitric acid, nor giving blueness to the persalts of iron. MM. Majendie and Robiquet have proved that it is the salt obtained by Derosne. The formula for narcotine is C_{48} H_{24} N O_{15}.

6. *Narceine*[1] is found in the aqueous solution of opium, after it has been freed from the morphia and narcotine by ammonia, and the meconate of ammonia which remains has been decomposed by baryta. On boiling the solution to expel the ammonia, and evaporating, the crystals which gradually form are *narceine*. When purified, they are white, acicular prisms, inodorous, slightly bitter, and pungent; soluble in 375 parts of water at 60°, and 230 parts at 212°; and in hot alcohol; but they are insoluble in ether. They neutralize acids imperfectly; the salts, when concentrated, become blue; and on adding successive portions of water, they change to violet, rose-red, and ultimately become colourless. The formula is C_{28} H_{20} N O_{12}.

7. *Meconine*[2] is a white, transparent salt, in acicular crystals, soluble in 266 parts of water at 60°, and 18 at 212°: it is also soluble in ether, alcohol, and the volatile oils, with the aid of heat. It is at first tasteless, afterwards acrid. It fuses and sublimes without change, and is neither alkaline nor acid. It is separated by precipitating the aqueous infusion of opium with ammonia,

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[1] Discovered by Pelletier in 1832.
[2] Discovered by M. Couerbe in 1832.

washing the precipitate, until it is nearly colourless, then evaporating all the watery solutions to a thickish consistence, and leaving the whole at rest for three weeks. The granular mass is next to be separated from the fluid, pressed and dried with a gentle heat; the result is *meconine.* It may be purified by dissolving it in boiling alcohol to form crystals, redissolving these in water, and digesting with animal charcoal, filtering whilst hot, and lastly crystallizing by spontaneous evaporation. Its formula, according to Couerbe, is $C_{10}\ H_5\ O_4$. Nitric acid converts it into nitromeconic acid.

8. *Porphyroxine,* a crystallizable substance, characterized by assuming a purple red colour when heated in dilute hydrochloric acid; a test proposed by Merck to be used in testing for the presence of opium. It is crystalline, occurring in needles, soluble in alcohol and ether, but not in water. Its formula is unknown.

9. *Meconic acid* may be obtained in a separate state by various processes. — *a.* By precipitating an aqueous solution of opium by means of acetate of lead, which throws down a meconate of that metal; then washing the precipitate with distilled water, and decomposing by passing through it a stream of sulphureted hydrogen gas; and lastly filtering and evaporating the fluid. Meconic acid crystallizes in small amber-coloured crystals. — *b.* By precipitating an aqueous solution of opium by chloride of barium, washing the precipitate, and then decomposing it with diluted sulphuric acid, which forms an insoluble salt with the baryta, and sets free the meconic acid. — *c.* By precipitating a solution of opium with lime, and acting on the meconate, mingled in hot water, with hydrochloric acid. The acid crystallizes on cooling. To obtain it pure, the crystals procured by the above processes are to be combined with potassa, and the meconate thus formed is to be decomposed by hydrochloric acid. Meconic acid has an acid taste, and reaction. It is soluble in water and alcohol; its solutions strike a deep cherry red with the sesqui-salts of iron, and an emerald green with sulphate of copper. Chloride of tin and nitric acid destroy the red colour of the solution of meconate of iron; it is not however decolorized by bichloride of mercury, which distinguishes it from sulphocyanide. Its formula is $C_{14}\ H\ O_{11} + 3\ H\ O$. It is a tribasic acid. Its crystals contain 6 additional equivalents of water.

A principle named *Pseudomorphia* has been stated to occur occasionally in opium, resembling morphia in some respects, but not decomposing iodic acid. Little is known about it; it is said to contain nitrogen.

Mulder obtained from an analysis of 100 parts of Smyrna opium the following proportions of ingredients: —

Morphia	10·842	Gummy matters	26·242
Codeia	0·678	Mucus	19·086
Narcotine	6·808	Fatty matters	2·166
Narceine	6·662	Caoutchouc	6·012
Meconine	0·804	Water	9·846
Meconic acid	5·154	Loss	2·118
Resin	3·582		

The proportions of these principles appear to differ considerably in the different kinds of opium.

Medical properties and uses.—Poppy heads or, more correctly, the capsules of the poppy, possess narcotic properties, similar to those of opium, but less energetic. They are chiefly employed, boiled in water, as fomentations to inflamed and ulcerated surfaces. An *extract*, which is employed as a substitute for opium, is prepared from these capsules by inspissating the decoction. A syrup also is prepared from them, and used as an anodyne for children, and to allay the tickling cough in chronic catarrh and phthisis. (See *Part* III.)

If we were to judge from the quantity of *Opium* imported into Great Britain, we should assume that it is more generally used than any other remedy, the average annual importation for eight years, from 1834 to 1841, exceeding 36,000 lbs.[1]; and the consumption in Great Britain alone being upwards of 16,500 lbs. It appears to have been introduced into the Materia Medica before the time of Hippocrates; but it was little employed as an internal remedy until 300 years after his period.

Opium operates on man—1st. as a powerful and very diffusible excitant, but its primary operation is soon followed by sedative effects, in a degree much greater than could be expected from the previous excitement it induces. 2. It acts directly on the nervous system; and when taken into the stomach deadens excitability, and allays pain in the most distant parts of the body, independent of the circulation, inducing some change in the nervous matter not recognisable by our senses. This is effected chiefly through the medium of the circulation. 3. It produces sleep. 4. It operates as an antispasmodic. 5. It excites diaphoresis.

As the principle on which opium acts is the same all over the body, the topical application of it is capable of producing similar effects to those resulting from it when it is taken into the stomach, only in a diminished degree. The larger the dose, the more quickly its primary action is extended over the whole habit; and as every part is excited nearly at the same moment of time, the general consequent exhaustion must necessarily more rapidly follow, than when the dose is merely sufficient to induce a degree of excitement scarcely exceeding the powers of the system on which it

[1] *Trade List*, quoted by Dr. Pereira, *Elements of Mat. Med.* &c. 2d edit. ii. p. 1731.

operates. Hence, either the stimulant or the apparently sedative effects of opium may be rendered obvious by the extent of the dose in which it is exhibited; and the early knowledge of this truth might have saved much of the keen controversy which the subject at one period occasioned.

In smaller doses opium slightly increases the fulness, the force, and the frequency of the pulse, and raises the temperature of the body[1], quickens respiration, and invigorates both the corporeal and mental functions: but by degrees these effects are succeeded by languor, lassitude, and sleep; the mouth and fauces become dry; the sensation of hunger, if it was present, ceases; a tendency to thirst supervenes with a feeling of debility, and the bowels become constipated. In larger than purely medicinal doses the state of languor and depression sooner supervenes; the pulse rapidly falls, the skin becomes hot, the appetite fails, thirst is augmented, nausea follows, with great depression of muscular power; the ideas become confused, the person sleeps imperfectly and dreams, and awakes with all the symptoms that accompany intoxication. In very large doses the primary excitement is scarcely apparent, but the pulse seems to be at once diminished, and soon becomes imperceptible; drowsiness and stupor immediately appear, and are followed by low delirium, sighing, deep and stertorous breathing, cold sweats, apoplexy, and death. In many instances no delirium nor stertor appear, but the poisoned person dies of collapse. If recovery takes place the sensations closely resemble those which follow on the morning after an evening's debauch of wine,—namely, nausea, vomiting, vertigo, a complete loathing of all food, and torpid bowels. When the dose has been very large, the appearances on dissection are those which indicate the previous existence of inflammation of the stomach and bowels; but no particular appearance of an inflammatory state, nor even great fulness of the vessels of the brain, are perceived.

If we examine the influence of opium upon the different organs, the following are found to be its effects:—

1. On the *stomach*, it operates first topically upon the nerves of that organ, and, thence, sympathetically on the nervous centres. It lowers the digestive power; and when taken into an empty stomach lessens the desire for food and the cravings of hunger[2]:

[1] It is extraordinary that Dioscorides, Galen, Aurelianus, and many of the ancients, believed that it produced cold. In the *Materia Medica* of Le Shechin of the Ming dynasty, a Chinese, it is ranked as a stimulant.

[2] The Turks call opium *afioni;* and in the *teriakhana*, or opium shops of Constantinople, they take it in graduated doses from ten grains to one hundred grains in a day. It is mixed with rich syrup and the inspissated juices of fruit, to render it more palatable and less intoxicating: and it is taken either with a spoon, or made up into small lozenges, stamped with the words *Mash Allah*, literally "The work of God." The Tartar couriers, who travel great distances, and with astonishing rapidity, take nothing else to support them during their journies. (*Dallaway's Constantinople*, 4to. 78.) There is, however, some reason for supposing that the Mash Allah, or Maslach of the Turks,

taken during a meal, the process of chymification is suspended, and after the digestion is arrested, if the dose be large, at the expiration of some hours the food is vomited nearly in the state as when it was swallowed. The same effects follow the introduction of opium into the rectum. In both cases constipation follows. If the stomach or the alimentary canal be suffering from subacute inflammation, opium causes thirst, dryness of the fauces, and vomiting: in cancer, if no ulceration be present, it allays pain; but if an open cancerous ulcer exist in the organ, it augments pain. In irritable conditions of the stomach and intestinal canal, it allays pain and griping, and checks diarrhœa.

2. On the *circulating* and *respiratory* organs, opium displays its influence by altering the pulse, and causing, according to the dose, more or less imperfect decarbonisation of the blood. That the influence is variable is demonstrated by the pulse being, in some cases, rendered small and feeble, in others full and soft. Its action on the capillary system is evinced by diaphoresis, itching of the skin, and dilatation of all the erectile tissues; whilst the temperature of the body gradually sinks. When the brain, however, becomes first affected, the pulse is quickened and rendered sharper than before, until coma supervene, when it again sinks, and at length becomes imperceptible. In poisoning by opium, the blood accumulates in the venous trunks and the right cavities of the heart; whilst that contained in the left ventricle is of a dark colour, from the imperfect respiration which the narcotic induces. In hypertrophy of the heart, opium causes a sensation of weight of the head and temporary deafness. In irritation of the mucous membrane it diminishes sensibility, re-establishes the due exhalation from the surface, and restores the natural action of the mucous follicles.

3. On the *secerning system*, opium operates by diminishing secretion in the ratio of its influence on the heart and arteries. If the dose, however, be moderate and frequently repeated, the stimulus given to the general system augments secretion; for the dryness of the mouth, the pale stools, and the diminished flow of urine, do not depend on defective secretion in the appropriate glands, but on the diminished action of the excretory ducts. The aphrodisiac influence of opium shows that it probably augments the spermatic secretion. Opium has been accused of suspending expectoration; but in an irritable state of the mucous membrane it rather tends to increase than to diminish bronchial exhalation; and, by allaying cough and lessening the erethism which exists,

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contains other narcotics, as those of *hemp* and of *lolium*, as well as opium. The Chinese, the Bornese, and the Sumatrans smoke opium. The *Limam* and *Battany Assei*, who indulge in this practice, "are, notwithstanding, the most healthy and vigorous people to be met with in Sumatra."—*Marsden's History of Sumatra.*

the sputa acquires that consistence which enables it to be easily ejected.

4. It is on the *nervous system* that opium chiefly displays its influence; and the same results, in this respect, follow its application to the surface of the body as when it is introduced into the stomach. It is probable that, in both cases, it is taken into the circulation, and conveyed to the brain and spinal cord. What change is produced on the nervous centres, we have no means of knowing: it operates in the same manner when injected into the rectum as when taken by the mouth. When applied to the surface its action is modified by the extent and the nature of the part to which it is applied; and also by the nature of the substances with which the opium is combined.

Medicinal administration of Opium.— On account of its primary excitant influence opium is efficaciously administered in some cases of debility,—as, for instance, in fevers of the typhoid kind, and intermittents; and, when combined with calomel, to check the progress of membranous inflammation and gangrene.

In low fever, opium is given with two intentions,—namely, 1. as an excitant, 2. as an anodyne. For fulfilling the first intention it is given in small doses frequently repeated, as an useful assistant to wine in supporting the vis vitæ: but its employment, as an excitant in fever, requires much caution. For fulfilling the second indication, and for allaying irritation, and obtunding the susceptibility of those morbid impressions which occasion watchfulness, delirium, tremors, and subsultus tendinum, opium is useful when the inflammatory state of the brain has been previously relieved by bleeding and cold applications to the scalp. If the pulse be soft, the skin cool, the face not flushed, the tongue moist, and there is no suffusion of the eyes, its salutary influence is striking. It is to this effect of it that Alibert and others ascribe its power, when moderately used, of rendering the human body less susceptible to different diseases.[1] Much caution, however, is required in its exhibition; for if the heat of the body be much above the natural standard, and the skin dry, opium may increase these symptoms, augment thirst, and occasion restlessness. But if moisture of skin be coming on, opium accelerates it, and tranquillity and sleep follow. Hence the propriety of Dr. Currie's advice, not to give the evening dose of opium in fevers till very late, or about one or two o'clock in the morning, when the heat is subsiding; or first to lower the temperature, and excite sensible perspiration by the effusion of cold water, or tepid sponging.[2] It is especially hurtful where there is a disposition to local inflammation of the

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[1] *Nouveaux Elémens de Thérapeutique*, &c. 4th edit. tome xi. p. 76.

[2] *Medical Reports on the Use of Cold and Warm Water*, i. 290.

substance of the lungs, or where sopor or coma supervene; and it is particularly so when the pupil is contracted.

In *intermittents*, opium very materially assists the curative influence of cinchona bark and the salts of quina. When given at the approach of the paroxysm, it sometimes arrests it altogether, or shortens and renders it milder: it abates the violence of the hot stage, by determining to the surface and inducing sleep. It is most advantageous when combined with calomel.

In *acute rheumatism*, opium is most beneficial when it is united with calomel and antimonials[1], and administered after bleeding: it is, also, usefully combined with colchicum, and always relieves when it determines to the surface; but, in order to afford permanent relief, it is requisite, at the same time, to purge very freely. In the other *phlegmasiæ*, opium cannot with propriety be used in the early stages; but after the inflammatory action is partially subdued by the lancet, it is useful in quieting cough, allaying pain, and procuring sleep. It renders the effect of the blood-letting more permanent, and operates as an antiphlogistic. With this view, it was first given in combination with opium by Dr. Hamilton of Lyme-Regis[2], and experience has fully confirmed his observations of its efficacy. In *enteritis* and *peritonitis*, a full dose of opium not only allays pain and procures sleep, but prevents reaction, and lessens the chance of the inflammation increasing. Dr. Stokes has used large doses of opium with great success in perforation of the intestines. On the same principle it is beneficial in *puerperal fever*, and other inflammatory affections of serous membranes.

In *eruptive diseases*, particularly small-pox, the liberal use of opium is found to be highly beneficial, when convulsions precede the appearance of the eruption, or if the accompanying fever assume the typhoid type. It is injurious in some other of the exanthemata. In the *diarrhœa* which succeeds measles it operates beneficially. In *malignant scarlatina* it is equally valuable; but its use is contra-indicated in the delirium of scarlatina, and altogether in this class of diseases when the fever is inflammatory. In *hæmorrhages* it is useful when the discharge arises chiefly from an increased degree of irritability, and where the pulse, instead of being strong and full, is small, quick, and intermitting. Hence its efficacy in the floodings of weakened habits after abortions. In *uterine hæmorrhages* the dose should be large, not less than sixty minims of the tincture. In combination with acetate of lead it has been recommended in *hæmoptysis* indicative of phthisis; and also

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[1] I know of no remedy which so effectually relieves the excruciating pain of acute rheumatism, which generally makes its attack at night, as the following combination, after one general bleeding, or the application of leeches to the painful joint: ℞ Calomelanos, gr. j. Antimonii potassio-tartratis, gr. j. Opii gr. jss. Fiat pilula, 8vâ q. q. horâ sumenda.

[2] *Edin. Med. Commentaries*, ix. 191.

after blood-letting, and in the hæmoptysis and hæmatemesis of the latter months of pregnancy.

Although opiates are hurtful at first, and seem to check expectoration in *bronchitis,* yet, when the cough remains obstinate, their good effects are undoubted; and in the contagious catarrh or influenza, an opiate at bed-time is requisite for quieting the cough in every stage of the disorder. In chronic bronchitis, when the bronchial tubes are loaded with viscid mucus, it may prove hurtful. In *dysentery,* the benefit to be derived from opium depends very much on the bowels having been previously well cleared, in which case it allays the tormina and tenesmus, and maintains the advantages obtained when its use is continued in combination with ipecacuanha and castor oil; and the same remark applies to diarrhœa. In dysentery it is most useful when combined with calomel, in which case it appears to act by retaining the mercurial in the duodenum.

The *spasmodic* and *convulsive diseases* are those in which opium is most evidently useful. In *tetanus,* although it does not always succeed, even when given in the largest doses, yet many cases have occurred in which the continued exhibition of large doses has overcome the spasm, and cured the disease; particularly when it has been judiciously combined with cathartics: often, however, very large quantities of the remedy have been taken without any sensible effect on the state of the habit, and without relieving the disorder; and the same is the case in *hydrophobia,* in which 180 grains of solid opium have been taken in the space of twelve hours, without producing any apparent effect. It has been found beneficial in *chorea;* but, as in tetanus, it is necessary to precede its use by strong cathartics, or at least to give it in combination with these.[1] In *epilepsy* not connected with organic lesions it proves useful when given in combination with musk; and it has been recommended by highly respectable authority [2] in *eclampsia;* but its efficacy in this complaint is rather doubtful. In *spasmodic asthma* opium shortens the paroxysms: it abates the violence of the cough in *pertussis,* when given after the primary fever subsides; and it is more especially useful in *pyrosis,* in combination with trisnitrate of bismuth; and in *cholera* than any other medicine. Solid opium, either alone or united with camphor, is the most effectual remedy for checking obstinate vomiting, proceeding from a morbid irritability of the stomach. In *colic* and *ileus* it is given in combination with laxatives; it allays the spasm and pain: it is equally efficacious in *flatulent colic* with hernia. As a remedy in *lues venerea,* opium is still relied on by some foreign practitioners [3], but the idea of its antivenereal powers has been justly exploded in

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[1] *Observations on the Administration and Utility of Purgative Medicines,* &c. 86.
[2] *Denman. Bland.*
[3] *Medical Communications,* vol. i.

this country; and it is properly regarded chiefly as an useful adjunct to mercury in this disease: "by diminishing the sensibility of the stomach and bowels, it prevents many of those inconveniences which this mineral is apt to excite in the primæ viæ, and allows it to be more easily introduced into the system."[1] In short, in all cases where the irritability is morbidly increased, and where it is of importance to lessen pain, and procure sleep, opium is undoubtedly the most valuable article of the Materia Medica. In none of the affections connected with this condition of the habit is it more beneficial than in *delirium tremens:* it has, however, in many instances been too empirically employed, and has been productive of harm.

Opium is contra-indicated in all morbid states of the body, where a strong inflammatory diathesis exists, unless preceded by blood-letting. In pulmonary affections, when the cough is dry and hard, and the expectoration difficult and scanty, it is hurtful; and, if not injurious, its use is at least doubtful in *mania,* in which it generally occasions restlessness instead of procuring sleep: nevertheless the salts of morphia often prove highly beneficial in insanity.

Externally applied, opium is almost as efficacious as when it is taken into the stomach, and it produces its narcotic effects with less liability of affecting the head or causing nausea. It is applied in the form of frictions, either combined with oil, or with the camphor liniment, or in the form of tincture: and thus used it may be prescribed in all the diseases above enumerated. We have often seen its good effects in colic; and have also witnessed its singular efficacy in symptomatic trismus, when rubbed on the jaw, and applied to the scrobiculus cordis by means of pledgets soaked in the tincture combined with the oil of turpentine. A piece of solid opium stuffed into a carious tooth relieves the pain of toothache; and introduced into the rectum, either in the solid form, or dissolved in water as an enema, it affords relief in *tenesmus,* in *painful affections of the prostate gland,* and in *spasmodic strictures.* A weak, watery solution of it, also, is an useful adjunct to injections in *gonorrhœa,* and to collyria in *ophthalmia;* and the vinous tincture dropped into the eye removes *ecchymosis,* and the suffusion which often remains in that disease after the inflammation has been subdued; and restores the tone of the diseased organ. The aqueous solution also lessens the pain of open cancer, when cloths soaked in it are laid over the sore; and it is as useful in lacerated wounds of tendinous and aponeurotic parts. In irritable sores, and in phagedena, cloths kept constantly moist with the tincture both relieve pain and favour cicatrization.

With respect to the influence of the salts of opium, separately

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[1] *Pearson's Observations, &c. on Articles used in the Cure of Lues Venerea,* p. 60.

administered, much might be said, did the nature of this work permit me to dilate on particular subjects. The value of Morphia and its salts are fully stated in the third part of this volume. (See *Morphiæ Hydrochloras* and *Morphiæ Acetas.*) *Narcotine* was stated by Majendie to operate as an excitant on dogs; but on the human subject it produces no excitant effects; at least none were perceived by M. Baily when it was given in doses of sixty grains; and Orfila ascertained that this is the case even when it is combined with acetic acid. It has, however, been prescribed, in combination with hydrochloric acid, with apparent advantage as an antiperiodic in ague; especially by Dr. O'Shaughnessy, who regards it as an antiperiodic equal to the salts of quina.[1] *Codeia,* according to the observations of M. Barbière, in its uncombined state, seems to operate on the nervous plexus of the great sympathetic as an anodyne, allaying pain in morbid affections of parts connected with that plexus. It neither quickened the pulse, nor disturbed the digestive function, nor induced constipation: and in causing sleep, when given in large doses, it did not affect the head like opium. The Editor has used codeia pretty largely, and from his experience cannot state that this alkaloid possesses much anodyne or narcotic property. In some cases, where the administration of half a grain of the hydrochlorate or acetate of morphia was invariably followed by complete relief of pain, five grains of pure codeia, given as a hydrochlorate, was found to be completely inefficient for the purpose; and no sensible effects followed its use. The influence of *Meconine* and *pseudo-Morphia* on the animal economy has not been examined; nor is anything known of the influence of *Narceine. Meconic acid* seems to exert no action on the living body.

Opium is generally exhibited either in substance as a pill, or under the form of tincture, and externally in that of infusion. It is necessary to avoid combining it with substances which decompose it; and therefore solutions of *bichloride of mercury,* the *acetates of lead,* the *alkalies,* the *carbonates of alkalies, lime-water, infusion of galls,* and infusion of *yellow cinchona bark,* and of all astringent vegetables, are incompatible in prescriptions with opium in solution, either in water or in spirits. In combination, however, with *vinegar,* the *vegetable acids,* and oil, its narcotic power is much increased, owing to the combination of the morphia with the acids, forming more active salts than the bimeconate of the opium.[2] The

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[1] *Brit. and For. Med. Review,* viii. 263.

[2] The effects of vegetable acids in augmenting the efficacy of opium is displayed in the great power of that preparation of opium, which has been known, for upwards of a hundred years, under the name of "*Black Drop.*" The following is the mode of preparing it, as published by Dr. Armstrong (vide *Practical Illustrations of Typhus*), from the papers of the late Edward Walton, of Sunderland, one of the near relations of Edward Tonstall, of Bishop's Auckland, by whom it was originally prepared. "Take half a pound of opium sliced; three pints of good verjuice; one and a half ounce of

result of my own experience inclines me to regard the acetate as well adapted for cases of phthisis and inflammatory affections, where it is of importance to obtain the sedative effect of the remedy free from its exciting quality.

The dose of opium should be regulated by the nature of the disease, and the peculiar intention for which it is ordered. The circumstance of the patient having been previously accustomed to its use must also regulate the extent of the dose, for in this case a dose, which to one unaccustomed to the use of the drug would prove fatal, may perhaps to another in the habit of taking it be scarcely sufficient to produce its narcotic effects. A quarter of a grain, or even less, frequently repeated, is, in general, sufficient to keep up its stimulant influence; and from gr. j. to grs. ij. act as an anodyne and produce sleep; while in *tetanus, hydrophobia,* the passing of a *gallstone,* and *urinary calculi,* and some other diseases, f ℥vss. of the officinal tincture have been given in twenty-six hours, without occasioning any bad effects, or even producing sleep.[1]

The use of opium for the purpose of exhilarating the spirits has long been common in Turkey, Syria, and China[2]; and of late years it has been unfortunately adopted by many, particularly females, in this country. Russell[3] says, that in Syria, when com-

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nutmegs; half an ounce of saffron. Boil them to a proper thickness, then add a quarter of a pound of sugar, and two spoonfuls of yeast. Set the whole in a warm place near the fire, six or eight weeks, then place it in the open air until it becomes a syrup; lastly, decant, filter, and bottle it up, adding a little sugar to each bottle." One drop of this preparation is calculated to be equal to three drops of the Tincture of Opium of the London College. It evidently owes its efficacy to the *acetate of morphia:* which is formed by the verjuice decomposing the bimeconate of the opium. The acetate itself is a more elegant preparation; and produces its effects in doses of $\frac{1}{2}$ a grain. There is also some reason for thinking that another preparation of opium, the *Liquor Opii Sedativus,* of Mr. Batley, of Fore Street, London, which has been justly esteemed an excellent preparation of the drug, owes some of its efficacy to the acetate of morphia, if it be not a simple impure solution of the *bimeconate.* The mode of preparing it is as yet kept secret; but I know that the whole of the resinous part of the opium employed is separated and rejected. Dr. Paris (*Pharmacologia*) states, as an objection to this preparation, that it undergoes some important change on being kept. Justice obliges me to say, that my experience does not allow me to concur in this remark. I used the remedy before it was sold to the Profession, and I gave it the name it bears; and although I have, since, constantly prescribed it, and kept the preparation in rather a warm situation, yet I have not observed the change of which Dr. Paris has spoken.

[1] *Currie's Medical Reports,* &c. i. 130.

[2] The inhabitants of these countries regard it also as an aphrodisiac. "Ad venerem enim ciere integræ nationes norunt, et in hunc usum adhibent; sic Japonenses, Chinenses, magis Indiæ, Persæ, Ægyptii, et Turcæ aphrodisiacum opium, referentibus Pr. Alpino, Saar (*Itinerar. Ind. Orient.*), Cleyer (*Eph. N. C.* 11. x. 35.). Fœminas Turcias opio viros incitare refert Jahn (*Mat. Med.* ii. 265.)." Vide *Opium Hist. Chem. atque Pharm. invest. per C. A. Christen.* 8vo. p. 53. In China opium is smoked, but the late war has demonstrated that the custom is illegal; and so late as 1796 the punishment was pilloring and the bamboo: at present (1840) transportation and death are the penalties; but nevertheless the custom prevails, and gains ground. Those who indulge in it are said rarely to live beyond fifty years of age. In a Chinese memoir, by Hen Naetse of Canton, on the subject of opium, it is said to make the breath feeble, to waste the body, and to destroy the teeth.

[3] *History of Aleppo,* i. 128.

bined with spices and aromatics, he has known it taken to the amount of ʒ iij. in twenty-four hours. Its habitual use cannot be too much reprobated. It impairs the digestive organs, consequently the vigour of the whole body, and destroys also gradually the mental energies. The effects of opium on those addicted to its use, says Russell, are at first obstinate costiveness, succeeded by diarrhœa and flatulence, with loss of appetite and a sottish appearance: the memory soon fails; the individuals become prematurely old, and then sink into the grave, objects of scorn and pity.[1] Much has been said and written respecting the smoking of opium by the Chinese, and the inhabitants of the Indian Archipelago. The preparation employed for smoking, and termed *Chundoo*, is a simple watery extract of the drug. Marsden, who saw it smoked in Sumatra, describes the pipe and the mode of using it. The tube of the pipe is usually made of bamboo, and upon its side is affixed a small tube into which the piece of Chundoo, which is to be smoked, made into a pill about the size of a pea, is put. This small tube is then applied to the flame of a lamp, it is volatilized, and the vapour sucked in by one full inflation of the lungs, or whiff, attended with a whistling noise. "The smoke," says Marsden, "is never emitted by the mouth, but usually receives vent through the nostrils, and sometimes by adepts, through the passage of the ears and eyes."[2]

The practice of smoking opium is said to affect very little the health of the more opulent Chinese, many of whom, says Mr. Smith, "within my own observation, have attained the age of sixty, seventy, or more, and are well known as habitual opium smokers for more than thirty years."[3] But Mr. Smith also states, that it is most destructive to those who live in poverty, and who carry it to excess.

The first effect of opium smoking is excitant: the smoker becomes loquacious, laughter is revived in him by the most trifling

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[1] Mustapha Shatoor, an opium eater in Smyrna, took daily three drachms of crude opium. The visible effects at the time were the sparkling of his eyes and great exhilaration of spirits. He found the desire of increasing the dose growing upon him. He seemed twenty years older than he really was: his complexion was very sallow, his legs small, his gums eaten away, and his teeth laid bare to the sockets. He could not rise without first swallowing half a drachm of opium. (*Phil. Trans.* xix. 289.) Some years ago I was consulted by a lady who took a wine pint and a half of laudanum every week, and who, as she began to experience its bad effects on her constitution, was anxious to discontinue it, but was uncertain how to proceed. I recommended her to get a three-pint bottle of the drug, and to continue her usual dose; but, after taking each portion out of the bottle, always to replace it with water; so that, in the progress of time, the bottle would contain water only, and her propensity would be cured. She continued the plan for one week only, and having left my neighbourhood, I have had no opportunity of knowing the consequence of her return to the abuse of opium. Opium appears to have no detrimental effect on white ants, who eat it freely, and in large quantities.

[2] *Hist. of Sumatra*, 3d edit. p. 278.

[3] *China*, 1838.

causes; but soon vacancy of countenance, pallor, shrinking of the features, and deep sleep succeed. But these effects are modified in different rates: thus the Malays become irritable, outrageous, and quarrelsome. The continuance of the vice causes the same effects as opium eating; both body and mind are soon deteriorated; diarrhœa occurs, with feelings of the utmost wretchedness; and if the poison be withheld, death terminates the victim's existence.

When opium has been taken into the stomach in an overdose, the first thing to be done for counteracting its bad effects, is to empty the stomach with the stomach pump, or, if that be not at hand, by the exhibition of a powerful emetic; and for this purpose ʒss. of sulphate of zinc, or from grs. x. to grs. xv. of sulphate of copper dissolved in water, or a dessert-spoonful of flower of mustard, in a large wine-glassful of water, should be immediately swallowed, and the vomiting kept up for a considerable time, and urged by irritation of the fauces; but as these substances sometimes fail in producing vomiting, the following draught has been recommended: ℞ Ammoniæ sesquicarbonatis, ℈j.; Pulv. Ipecacuanhæ, ʒ ss.; Aquæ Menthæ pip. f. ℥ iij.; Tinct. Capsici, f ʒ ij.[1] This has certainly the advantage of rousing the system, at the same time that it evacuates the stomach. If infusion of galls, or any vegetable astringent be at hand, it should be administered before the emetics. Large draughts of vinegar and water, or other acidulated fluids, should be frequently taken, after the stomach has been completely evacuated, and the powers of the habit may also be roused by brandy, coffee, and cordials. The sufferer should be kept awake by stimulating the skin, by dashing cold water on the face and chest, and by the application of electrical shocks persevered in for a long time; and, if possible, he should be kept in continued gentle motion. Dr. Currie recommends the effusion of warm water at 106° or 108°[2], for removing the drowsiness, after vomiting, or the use of the stomach-pump. The costiveness, which supervenes, when the patient recovers, should be treated with aromatic purges, and the tone of the habit restored by stimulating tonics and the shower-bath. In some idiosyncrasies even the external application of opium will produce poisoning. In a case related by M. Guiand, jun., of Marseilles, an ounce of laudanum, applied in a poultice to the limb of a soldier in the Hospital of St. Louis, at Paris, afflicted with erysipelas, produced all the symptoms which follow from a large dose taken into the stomach, and ended in death. The only appearances observed on the dissection were a few red injected spots in the arachnoid; but a strong odour of opium exhaled from the body.[3] When either simple morphia, or any of its salts, are taken

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[1] See a paper by Mr. Sprague, *Medical Repository*, vol. xviii. p. 125.

[2] *Reports on Water*, i. 80.

[3] *Observateur des Sciences Méd. Marseilles, Août*, 1825.

in an over-dose, say two or three grains, they operate as a virulent poison. The symptoms are headache, frightful reveries, vertigo, dimness of sight, subsultus, violent agitation, and obstinate vomiting. The pupil, in the majority of cases, is contracted. There is pain also in the epigastric region, and in the course of the intestines, but the breathing is not much effected. Pruritus of the skin is almost a constant symptom of poisoning by morphia.[1] M. J. L. Lassaigne has proposed the following method of detecting it when it has proved fatal. Digest the stomach or its contents, evaporating nearly to dryness in alcohol, and precipitate by the diacetate of lead. Filter the solution, and pass through it a stream of sulphureted hydrogen gas to precipitate any excess of the salt of lead; then evaporate the solution in vacuo, and add to the residue nitric acid. If morphia or any of its salts be present, a yellow-orange colour, which changes to a blood-red, will be produced.[2] Another method proposed by Serullas is to evaporate a portion of the suspected fluid, then to mix it with a small portion of a neutral iodate of potassa, and some mucilage of starch: on adding a drop or two of sulphuric acid, if the mixture contain morphia, the blue colour will be instantly produced. In this case the iodic acid of the iodate is decomposed, and iodine being set at liberty strikes the blue colour. If iodic acid be used, no sulphuric acid is requisite: but neither the iodate nor iodic acid are good tests. When the poison has been opium or its tincture, it may be detected by precipitating the suspected fluid with diacetate of lead, washing the meconate of lead thus procured, and then decomposing it by sulphuric acid. Meconic acid is thus set free, and is readily detected by a solution of any persalt of iron. The acetate of morphia is easily separated from the supernatant fluid; and its quantity ascertained. When the salt is procured, its nature as a salt of morphia may be demonstrated, by its producing a blue colour when tested with tincture of chloride of iron, becoming red with nitric acid and decomposing iodic acid.

Officinal preparations.—Of Poppy Capsules and Opium, and also those in which Opium forms an important ingredient. Of the Poppy Capsules: *Decoctum Papaveris*, L. E. D. *Extractum Papaveris*, L. E. *Syrupus Papaveris*, L. E.—Of Opium: *Confectio Opii*, L. *Elect. Opii*, E. *Electuarium Catechu*, E. *Extractum Opii*, L. E. *Extractum Opii aquosum*, D. *Pilulæ Opii*, E. *Pilulæ Saponis comp.* L. D. *Pilulæ Ipecacuanhæ et Opii*, E. *Pilulæ Calomelanos et Opii*, E. *Pilulæ Plumbi Opiatæ*, E. *Pilulæ Styracis*, L. E. *Pulvis Cretæ Opiatus*, E. *Pulvis Cretæ comp. cum Opio*, L. *Pulvis Cretæ Opiatus*, D. *Pulvis Ipecacuanhæ comp.*, L. E. D. *Pulvis Kino. comp.* L. *Acetum Opii*, E. D. *Tinctura Opii*, L. E. D. *Tinctura Camphoræ composita*, L. *Tinc-*

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[1] *Lond. Med. Repos.* vol. i. *New Ser.* p. 80.
[2] *Bulletin des Sciences Médicales*, t. i. p. 147.

tura Opii Camphorata, E. D. *Tinctura Opii ammoniata*, E. *Vinum Opii*, L. E. D. *Emplastrum Opii*, L. E. D. *Enema Opii*, L. E. *Linimentum Opii*, L. E. D. *Trochisci Opii*, E. *Unguentum Gallæ*, L. E.

PAREIRA. See *Cissampelas.*

PETROLEUM. See *Bitumen.*

PHASIANUS. *Syst. Nat. Gmelin.* i. 737.

D. 1. Vertebrata. *Cl.* 2. Aves. *Ord.* 4. Gallinaceæ. *Cuvier.*
G. 101. *Beak* short, strong. *Cheeks* made smooth, with a naked skin. *Feet* spurred.
Species 1. P. *Gallus.* The Dunghill Fowl. *Willd. Ornith.* 154. *t.* 26.
Officinal. OVI ALBUMEN ET OVI VITELLUS, *Lond.* OVUM, *Edin. Dub.* White and yolk of egg of Phasianus Gallus, or domestic Hen.

Syn. Œuf. (*F.*), Ein, Ey (*G.*), Ouvo (*I.*), Huevo (*S.*), Ey (*Dutch*), Aeg (*Dan.*), Agg (*Swed.*), Ovo (*Port.*), Jaico (*Russ.*), Jaie (*Poln.*), Wegze (*Bohm.*), Muna (*Finl.*), Moune (*Lapl.*), Jemurda (*Turk.*), Tochem (*Pers.*), Mënnik (*Greenl.*), Mannig (*Esquimaux*), Mootay (*Tam.*), Anda (*Sans.*), Gubbel (*Bornouse*).

The common domestic fowl is too well known to require any description. The country whence it originally came has not been correctly ascertained, although it is conjectured that it was brought from Persia by the Phœnicians, about 500 years before the birth of Christ.[1] As an article of food, it is the least stimulating of animal substances; and the broth made of the young fowl or chicken is not only the best restorative diet for the convalescent, but is also a useful diluent in cholera, dysentery, and other disorders of the bowels. After they are a year old, their flesh becomes less and less digestible; but the capon and poulard retain their tenderness longer.

The egg consists of two distinct fluid matters, the white and the yolk; the membranes which enclose these; and the shell.[2]

Qualities. — The *white* of the egg is inodorous and insipid, of a glairy, viscid nature, readily dissolving in water, coagulable by a heat of 165° Fahrenheit, and also by acids and alcohol. When coagulated it becomes sapid, and is no longer soluble either in cold or hot water. It consists of a cellular membrane formed of *solid albumen* and of *liquid albumen*, contained in these cells. From the experiments of Dr. Bostock, it appears to be composed of 80 *water*, 15 *albumen*, and 4 to 5

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[1] *British Zoology*, i. 280. There is a variety of the common fowl, named the *Dorking Fowl*, from being generally procured at Dorking in Surrey, which has two toes behind instead of one. Another variety is found at Mozambique, and at Siam, which has the skin, bones, periosteum, and sometimes the flesh, quite black, and yet it is esteemed good eating.

[2] Hens have been known to lay eggs when twenty years old. — *Supplement to Latham*, 207.

of *mucus* = 100·0 parts; and, besides, it shows traces of *uncoagulable matter* and *salts,* and *sulphureted hydrogen gas.* The *yolk* is also inodorous, but has a bland, oily taste; and when agitated with water forms a milky emulsion. It is enclosed in a sac (the *yolk bag*), which has twisted flocculent chalazæ. When long boiled, it becomes a granular solid, and yields by expression a yellow, insipid, fixed oil. It consists in 100 parts of 28·75 of yellow *oil,* 17·47 *albumen,* and 53·8 of *water;* on the presence of the albumen depends the hardness of the boiled yolk. The *shell* consists of 72 parts of *carbonate of lime,* 2 *phosphate of lime,* and *magnesia,* and *animal mucus,* 3 of *gelatin,* and 23 *water* = 100·00. When it is burnt, the carbonic acid is dissipated, the animal cement destroyed, and pure lime, with phosphate of lime, obtained. As long as the yolk remains suspended in the centre of the albumen, an egg is supposed to be good; but it spoils as soon as the yoke touches the shell. The preventing the admission of air through the pores of the shell preserves eggs for a longer period than they otherwise could be kept good. This is effected by covering the egg with grease, or dipping it into lime water; both of which form coatings impermeable to air. A fresh or good egg appears semitransparent, when placed between the eye and the light: but when it is opaque or irregularly clouded, it must be rejected.

Medical properties and uses. — The yolks of raw eggs are gently laxative, and have been thought serviceable in jaundice and other hepatic obstructions. Beaten up with sugar and wine, they are extremely nutritive, and are consequently useful in convalescences, and other cases of debility. The white or albumen is an antidote in poisoning by corrosive sublimate, sulphate of copper; and in all cases of acrid or corrosive poisons. The oil which is procured by acting on the hard boiled yolk with alcohol, and distilling off the spirit from the filtered tincture, is useful in sore nipples. In pharmaceutical operations, the yolks are used for rendering oil and balsams miscible with water; and the whites for clarification.[1] The shells are antacid; but possess no advantages over chalk when they are unburned, or lime when they are burned.

The yolks are contained in the *Mistura Spiritus Vini Gallici,* Lond.

PHOSPHORUS.[2]

Officinal. PHOSPHORUS, *Lond.*

Syn. Phosphore (*F.*).

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[1] Owing to peculiar idiosyncrasy the smallest portion of the white of egg cannot be eaten by some persons without occasioning pain, sickness, and an erythematic eruption on the skin.

[2] *Φωσφορος* from *φῶς, light,* and *φέρειν, to carry.*

This substance is found, in combination, in great abundance in both the organic and the inorganic kingdoms of Nature. The mode of procuring it in a free state was discovered by Brandt, a chemist of Hamburgh, in 1669; he prepared it from putrid urine, but the process remained a secret until 1737; and in 1769 Jahn having discovered it in bones, Scheele made public the method of preparing it which is now practised. The bones are first calcined completely, to destroy their animal matter; they are then reduced to a fine powder, and digested with two-thirds their weight of strong sulphuric acid, and a small quantity of water to give the whole the consistence of a thin paste. The phosphate of lime, the proportion of which is about four-fifths of the calcined bones, is thus decomposed, and a sulphate of lime and a superphosphate of lime are formed. The former is nearly insoluble, the latter is dissolved in hot water, and the filtered solution evaporated to the consistence of syrup: it is then mixed with one-fourth of its weight of charcoal, and strongly heated in an iron vessel, and, when quite dry, transferred to a stoneware retort, to which a wide bent tube is luted, the beak of the retort being placed under water. As the heat increases, the phosphorus distils, and is condensed in the water; a second distillation renders it pure, or it is fused, and passed through chamois leather under water. In this process the charcoal decomposes the acid of the superphosphate, carbonic acid and phosphorus pass over, and phosphate of lime and redundant charcoal remain in the retort. The fused phosphorus is lastly run into moulds and formed into small cylinders.

Qualities.—Pure phosphorus is diaphanous, and almost colourless, but it usually has a pale yellow hue: it is flexible, ductile, soft enough to be cut with a knife, and displays on the cut surface a waxy lustre. It has the odour of garlic. Its sp. gr. is 1·77. It melts at 108°, and is sublimed in vapour at 550°. It is stated to be insoluble in water; but when kept in that fluid it yields to it both odour and taste. It is partially soluble in alcohol and ether, and, by the aid of heat, dissolves in oils, both fixed and volatile. Exposed to the air at 60°, phosphorus undergoes slow combustion, and is converted into *phosphorous* acid, by abstracting the oxygen from the air. A very slight degree of heat, even friction between the fingers, inflames it, and it burns rapidly, forming *phosphoric* acid. The cylinders are usually kept in water, and when exposed to light acquire a white coating, which Rose[1] has ascertained to be neither an oxide nor a hydrate, but a peculiar mechanical change in the phosphorus. It may be reduced to powder, by melting it under water in a closed vessel and shaking the whole until it is cold. There exists an amorphous red variety of phosphorus which is

[1] *Pog. Annalen*, xxvii. p. 565.

luminous and inflammable at a high temperature only. The equivalent of phosphorus is 32·02.

Medical properties and uses. — Phosphorus is a most powerful excitant and diuretic; and, except in small doses, operates as a poison. Its obvious effects are displayed on the generative organs, as an aphrodisiac, a fact confirmed by the experiments of Leroy [1], Chenevix, and Bouttatz, on themselves. It has been employed on the Continent in low, sinking conditions of the habit, the result of various diseases, and in impotency. As ether diminishes the inflammability of phosphorus, the etherial solution, made with gr. iij. of phosphorus, and f℥j. of ether [2], has been chiefly employed in doses of ten drops, in any bland vehicle, repeated every second, third, or fourth hour, according to circumstances. M. Lescot and others prefer oil as a vehicle. M. Lescot digests ʒj. of phosphorus cut into small pieces in ℥j ss. of olive oil, and after allowing the compound to stand in a dark place for fifteen days, he decants the oil, and flavours the solution with oil of bergamot. The dose of this oil is ♏ xx to ♏ xxx in any bland mucilage. Under every circumstance, the utmost caution is requisite during the internal administration of phosphorus.

It is used in forming the *Acidum Phosphoricum dilutum,* Lond.

PHYSETER. *Syst. Nat. Gmelin,* i. 227.

D. 1. Vertebrata. *Cl.* 1. Mammalia. *Ord.* 8. Cetacea. *Cuvier.*
G. 39. *Teeth* in the lower jaw, but none in the upper. *Tube* in the head, or great front.
Species 2. P. *Macrocephalus.* Spermaceti Whale. *Willough. Pisc. t.* A. 1. *f.* 3. *Phil. Trans.* lx. 321. *t.* 9.
Officinal. CETACEUM, *Lond. Edin. Dub.* Spermaceti, a concrete substance from the head of the Physeter Macrocephalus.

Syn. Spermaceti; Cétine (*F.*), Wallrath (*G.*), Walschot (*Dutch*), Walraf (*Swed.*), Spermaceti (*I.*), Espermaceti (*S.*).

This species of whale inhabits chiefly the Southern Ocean, although it is occasionally seen in the European seas. It is a large fish, the male generally measuring about sixty feet in length, and thirty in circumference at the thickest part of the head, which is blunt, and about nine feet in height. It is of a blackish colour on the upper part of the body, and white on the belly. The teeth do not appear in the male until it has attained the length of thirty-four feet; there are forty-six double teeth in the lower jaw, which is shorter than the upper; and in the head is a triangular, bony cavity, covered by the common integuments only, and filled with an oily fluid, which, on the death of the fish, con-

[1] *Biblioth. de Therap.* ii. 28.
[2] *Ether phosphoratus* of the Paris Codex.

geals into a spongy mass. The eyes are small, without cilia and tarsal cartilages on their lids: the pectoral fins are near the angles of the mouth; and the tail is forked.

The spongy oily mass is taken out from a triangular cavity of the head, which is called the case; and this first being boiled, the oil separates from spermaceti by filtration.[1] In this state it has a yellow unctuous appearance, and is brought to England in barrels. The following is the mode of purifying it in the great way. The mass is put into hair bags, and pressed between two plates of iron, in a screw-press, until it becomes hard and brittle. It is then broken into pieces and thrown into boiling water, where it melts, and the impurities, rising to the surface, are skimmed off. After being cooled and separated from the water, it is put into fresh water in a large boiler, and a weak ley of the potassa of commerce added to it by degrees. This part of the process is thrice repeated, after which the whole is poured into coolers, where the spermaceti slowly concretes into a white semi-transparent mass, which, on being cut into small pieces, assumes the flaky aspect it has in the shops.[2]

Qualities. — Purified spermaceti is a white, crystallized, friable, semi-transparent, unctuous substance, nearly inodorous and insipid. Its specific gravity is 9·433. It melts below 212° Fahrenheit[3]; and at a higher temperature, 500°, evaporates very little altered; although by repeated distillations it is partly decomposed, and a brown acid liquor obtained. Like the fixed oils, it leaves, when heated on paper, a greasy stain, and can be diffused in water by means of the yolk of egg or mucilage. It is insoluble in water; but is soluble in 13 times its weight of boiling alcohol, and still more soluble in ether and oil of turpentine: but it concretes again as the fluids cool: it is completely soluble in the fixed oils. When boiled with alcohol, it becomes more brilliant and less unctuous, less odorous, and more soluble in alcohol: the white crystalline scales deposited as the solution cools have been called *Cetine.*[4] This principle melts at 120° Fah., is not readily saponified: but when heated with strong alkalies is resolved into a neutral substance, *Ethal,* and an acid not unlike Margaric acid, named *Ethalic Acid.* The composition of cetine may be represented by the formula $C_{64}\ H_{66}\ O_4$.

Medical properties and uses. — Spermaceti is demulcent and emollient. It, however, possesses no advantages for internal use over the fixed bland oils. It is used in dysentery and irritations of the alimentary canal, and in catarrh and phthisis: but in the

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[1] An ordinary sized whale will yield upwards of twelve large barrels of crude spermaceti.

[2] *Monthly Magazine*, August, 1809.

[3] Bostock, *Nichol. Journn.* iv. 134.

[4] Chevreuil, *Ann. de Chim. et de Phys.* tom. vii. p. 157.

latter cases it is less beneficial than the bland oils; for, as these are readily united with water by means of alkalies and mucilages, the compounds formed with them are more viscid, and better adapted for smearing the fauces. Several imaginary healing virtues were, formerly, supposed to belong to spermaceti; on which account it was and still is often given to women in child-bed. It is, however, when combined with water by means of the yolk of egg, a pleasant vehicle for tincture of opium, when the after-pains are troublesome. It forms a part in the composition of several ointments.

The dose is from ʒ ss. to ʒ j ss. rubbed with sugar, or in the form of emulsion.

Officinal preparations. — *Ceratum Simplex*, E. *Ceratum Cetacei*, L. *Unguentum Cetacei*, L. D.

PICRENA EXCELSA. See *Quassia.*

PIMENTA. See *Myrtus.*

PIMENTÆ OLEUM, *Lond.* See Part III.

PIMPINELLA. *Spec. Plant. Willd.* i. 1471.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Umbelliferæ.
G. 562. *Fruit* ovate-oblong. *Petals* inflected. *Stigma* nearly globular.
Species 8. Pimpinella *Anisum.*[1] Anise. *Med. Bot. 3d edit.* 135. *t.* 52. *Hayne*, vii. 22.
Officinal. ANISUM, *Lond. Edin. Dub.* Anise-seeds. Fruit of Pimpinella Anisum.

Syn. Graines d'Anis (*F.*), Anis (*G. Swed. Russ.*), Annis (*Dan.*), Anice (*I.*), Herva doce (*Portug.*), Anis; Matalahuga (*S.*), Anys (*Dutch*), Anyz (*Poln. Bohm.*), Anison (*Arab.*), Souf (*H.*), Seri nisii (*Jap.*), Razianeh roomi (*Pers.*), Adis manis (*Javanese*), Somboo (*Tam.*), Jera manis (*Malay*).

This is an annual plant, a native of Egypt; but it is cultivated abundantly in Malta, Spain, and throughout Europe[2]; flowering in July. It is a delicate plant, and rises about a foot only in height. The stem is striated, smooth, jointed, and branching: the lower leaves are roundish, lobed, and toothed; but the upper ones are divided into narrow, pinnated segments: the flowers are small and white, in flat, terminal umbels, without involucres; the fruit is a *cremocarp*, or two united *mericarps*, with a stalk attached. They are ovate, contracted at the sides, swelling, striated, with entire filiform ridges; have many vittæ; and the whole fruit

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[1] "Ἄνισον of Dioscoridis, who says — "lactis ubertatem præstat, venerem stimulat." l. 3. c. 65.

[2] A considerable quantity is cultivated at Mitcham in Surrey, chiefly for the use of the rectifiers of British spirits. — *Stevenson's Survey*, 279.

is slightly pubescent, and of a greenish colour. The entire ridges distinguish aniseed from the fruit of Conium *maculatum*, with which they have been sometimes found mixed; and which have crenated ridges.

The anise grown in this country ripens its fruit sufficiently to be gathered about the middle of August. A greater quantity of fruit however than is grown here is annually imported from Malta, Spain, and Germany. The Spanish is small, and generally preferred. The heaviest is the best.

Qualities.—Anise has an aromatic odour, which is increased when the fruit is rubbed in the hands: it has a sweetish, warm, grateful taste.[1] Both alcohol and water extract the virtues of anise; and in distillation with water the fruit yields a yellowish, volatile oil, which concretes at a temperature of 50° of Fahrenheit. An oil of a greenish colour also is obtained from anise by expression; it consists of a bland, fixed, inodorous oil, mixed with a large portion of the proper volatile oil. According to Brandes and Reimann, the fruit of anise contains *volatile oil, stearin, resin, fatty oil, phytocol, uncrystallizable sugar, gum, extractive, a substance analogous to ulmin, gumoin, lignin, salts,* and *water.*[2]

Medical properties and uses.—These seeds are carminative; and are supposed to possess the power of promoting the secretion of milk. They are chiefly used in flatulencies, and in the tormina of infants. They are given in substance bruised, in doses of from grs. x. to ʒ ij.

Officinal preparations.—*Oleum Anisi,* E. D. *Spiritus Anisi,* L. *Essentia Anisi,* D. *Aqua Anisi,* L. D.

ANISI OLEUM, *Lond.* See Part III.

PINUS. *Spec. Plant. Willd.* iv. 494.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Coniferæ.

G. 1711. *Male.* *Calyx* four-leaved. *Corolla* none. *Stamens* many. *Anthers* naked.

——— *Female.* *Calyx* strobiles, with a two-flowered scale. *Corolla* none. *Pistil* one. *Nut* with a membranous wing.

* *With double leaves.*

Species 1. P. *Sylvestris.* The Wild Pine, or Scotch Fir. *Med. Bot. 2d edit.* 1. *t.* 1. *Smith, Flora Brit.* 1031. *Lambert, Description of the genus Pinus,* i. *t.* 1. *Michaux, North American Sylva,* vol. iii. pl. 138.

**** *With fascicled leaves.*

Species —. P. *Palustris.* P. *Australis.* The Swamp Pine. Long-leaved Pine, Yellow Pine or Pitch Pine.

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[1] The fruit of Myrrhis *odorata*, and of Illicium *anisatum*, have the taste and odour of anise.

[2] *Gmelin, Handb. der Chim.* ii. 1277.

Species —. P. *Tæda.* The Frankincense Pine. The Loblolly or Old Field Pine of the Southern States.

Species 24. P. *Larix.* The Larch. *Med. Bot. 3d edit.* 7. *t.* 4. *Lambert,* 53. *t.* 35.

***** *With solitary leaves, distinct at the base.*

Species 27. P. *Balsamea.* Balm-of-Gilead Fir. *Lambert,* 48. *t.* 31. *Pursh,* ii. p. 639. Abies *balsamifera. Michaux,* iii. pl. 150.

Species 32. P. *Abies.* Norway Spruce Fir. *Med. Bot. 3d edit.* 4. *t.* 2. *Lambert,* 37. *t.* 25. Abies *picea. Michaux, North American Sylva,* pl. 146.

1. PINUS SYLVESTRIS, PINUS PALUSTRIS, PINUS TÆDA, ET ALIÆ SPECIES.

Officinal. α. TEREBINTHINA, *Lond.* From P. *Palustris* et P. *Tæda,* L.

β. TEREBINTHINÆ OLEUM, *Lond. Edin. Dub.* Prepared from Terebinthina vulgaris, *L.* From various species of Pinus and Abies, *E.* From P. *Sylvestris,* D.

γ. RESINA, *Lond. Edin. Dub.*

δ. PIX LIQUIDA, *Lond. Edin. Dub.* From P. *Sylvestris* and other species, *L.* From various species of Pinus and Abies, *E.* From P. *Sylvestris,* D. PIX, *Lond.* PIX ARIDA, *Edin.* From Pix liquida, *L.* From various species of Pinus and Abies, *E.*

Common Turpentine. Oil of Turpentine. Resin. Tar. Black Pitch.

Syn. α. Térébinthe (*F.*), Gemeiner Terebinthin (*G.*), Tjock terpentin (*Swed.*), Gemeen terpentin (*Dan.*), Trementina (*I.* & *S.*). Cota (*Nepaulese*), Ratingeroo mie (*Arab.*), Zungbarie (*Pers.*).

β. Huile essentiale de Térébinthe (*F.*), Terbenthinöhl (*G.*), Olio della Trementina (*I.*), Azeyte de Trementina (*S.*).

γ. Resine blanche et jaune (*F.*), Fichtenharz (*G.*), Ragia di pino, Resina gialla (*I.*), Resina de pino (*S.*).

δ. Goudron (*F.*), Theer (*G.*), Tjara (*Swed.*), Pece liquida, Catrame (*I.*), Brea (*S.*), Degot (*Russ.*).

The Wild Pine, or Scotch fir, Pinus *sylvestris,* so named from its growing wild on the Scotch mountains, is common in most of the northern parts of Europe.[1] It is a straight, abruptly-branched tree, rising, in a favourable soil, to the height of more than eighty feet, and acquiring four or five feet in diameter, covered with a rough, cracked, brownish-coloured bark, and always clothed with foliage. The leaves are short, linear, entire, pointed, concave on one side, and convex on the other, about two inches long, twisted, of a bright dark-green colour above; glaucous beneath; and issuing in pairs from a white, truncated, lacerated sheath. The flowers are terminal, erect, of a sulphur-yellow tint: the *male catkin* is

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[1] When Cæsar asserted that the fir did not grow in Britain, he must have meant the *P.* Abies. The ancient name of the fir in Scotland was *Gius,* in Ireland *Giumhus,* and in Wales *Fynnidwydh.* The following also are synonyma of this tree. *Die Kiefer* (G.), *Pynboom* (Dutch), *Furr* (Dan.), *Tall* (Swed.), *le Pin* (F.), *il Pino* (I.), *el Pino* (S.), *O. Pinheiro* (Port.), *Sosna* (Russ.), *Mandy* (Findl.), *Betze* (Lapl.), *Maats* (Japan.), *Sum* (Chinese), *Bor* (Sclav.). It prefers an arid, silicious soil.

densely spiked, bracteated, elliptical, obtuse, with numerous scales crested on the upper side, but on the under bearing a sessile anther: the *female* is inferior, often ternate, or three together round the branches, peduncled, smooth, of a green colour, and changes into a small, nearly pointed, ovate-conical, greyish strobile or cone, which appears at first tesselated and warty, but, afterwards opening, disperses from within each scale two small black-winged seeds.

This tree is at its perfection when between seventy and eighty years old; but it yields turpentine at the age of forty.[1] Those trees which are most exposed to the sun, and have the thickest bark, afford it in the greatest abundance. The operations for procuring it commence in the month of May: the outer bark is stripped off for six inches, so as to expose the inner smooth bark, near the foot of the tree, and a wound made with a sharp tool three inches square, and an inch deep. The resinous juice soon begins to exude in transparent drops, which fall into a hole previously dug at the foot of the tree: fresh incisions are successively made till September, when the cold checks the further exudation. The warmer the weather is, the greater quantity of turpentine is obtained; and a healthy tree may thus yield from six to twelve pounds of turpentine annually, for a century of years. The turpentine which flows into the holes dug at the bottom of the tree is called *pure dipping*. Part of the juice concretes in the wounds, and is called *galipot* in Provence, and *barras* in Guienne; but although it contains oil, yet it is not used for the purpose of procuring it. The proper turpentine is purified by being exposed to liquefy in the sun's rays, in barrels perforated in the bottom, through which it filters.

PINUS PALUSTRIS.[2] *Spec. Plant. Willd.* iv. 499.

P. Australis. *Michaux, North American Sylva,* iii. 133.

Leaves in threes, very long; *stipules* pinnatifid, ramentaceous, persistent; *strobiles* sub-cylindrical, armed with sharp prickles.

This is a very large indigenous tree, growing in dry sandy soils, from the southern part of Virginia to the Gulf of Mexico. Its mean elevation is sixty or seventy feet, and the diameter of its trunk about fifteen or eighteen inches for two-thirds of this height. The leaves are about a foot in length, of a brilliant green colour, and united in bunches at the ends of the branches. This tree furnishes by far the greater proportion of the turpentine, tar, &c., consumed in the United States, or sent from this to other countries.

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[1] Great ravages are committed on this tree by Bostrichus *piniperda*, an insect which, by introducing itself into the cellular integument, separates the bark from the wood, and thus destroys the life of the plant.

[2] *United States Dispensatory.*

PINUS TÆDA.[1] *Spec. Plant. Willd.* iv. 498.

Michaux, North American Sylva, iii. 156.

Leaves in threes, elongated, with elongated sheaths; *strobiles* oblong-conical, deflexed, shorter than the leaf; *spines* inflexed.

It is abundant in Virginia, where it occupies the lands which have been exhausted by cultivation. It exceeds eighty feet in height, has a trunk two or three feet in diameter, and expands into a wide spreading top. The leaves are about six inches long, and of a light green colour. It yields turpentine in abundance, but less fluid than that which flows from the preceding species.

The quantity of turpentine annually imported into Britain is about 12,000 tons. That brought from Bordeaux is prepared from the Pinus *maritima* (Pinus Pinaster of Lambert): it is known by its turbidness and whitish colour; its separation into a thin, yellow, almost transparent portion, which floats above a thick, honey-like substance; and its acrid, bitter, nauseous taste. That imported from North America is the produce of the Pinus *palustris* and Pinus *tæda*. It is yellowish-white, translucent or opaque: semi-fluid in warm, opaque in cold weather: warm, bitter, and aromatic. It contains many impurities.

The *oil of turpentine* is obtained chiefly by distilling the pure turpentine and galipot with water in a common still. The American turpentine is that mostly used for this purpose. The oil is found in the receiver swimming on the water, from which it is easily separated: the average proportion is about 16 lbs. of oil from 100 lbs. of good turpentine. When rectified it is called *spirit* or *essential oil* of *turpentine*. This process of procuring oil of turpentine is carried on both abroad and at home; but the oil drawn in this country is always preferred.

Common resin, or *yellow resin*, is the residue of the distillation of turpentine. It receives different appellations according to the mode in which the process is carried on. When the distillation is performed without addition, and continued to dryness, the residue is called *common resin* or *colophony*[2]; but when agitated with about one eighth of fresh water while yet fluid, it is named *yellow resin*. A similar resin is made by melting and agitating the *galipot* in water; and this is preferred in general to the former kind, on account of its greater ductility, which arises from its containing a portion of oil.

Tar[3] is the last fluid preparation from these species of pine which we have to notice. The greater part of the tar imported

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[1] *United States Dispensatory.*

[2] The colophonia of the ancients was a liquid resin, named from Κολοφων, a town of Ionia, in Asia Minor, whence it was brought.

[3] Κωνον Græcorum.

into Britain is brought from the Baltic—*i. e.* Russia, Sweden, and Denmark; but a considerable quantity comes from the United States of America, where it is chiefly obtained from the Pinus *Australis* vel *Palustris*, long-leaved pine of Michaux, and is still prepared, by the process termed *distillatio per descensum*, in nearly the same manner as described by Theophrastus and Dioscorides to have been practised by the ancients.

The pine or fir trees intended to yield tar are decorticated and left for a year, after which they are felled, and the roots and the branches of the trees cut into billets, split, and piled in a kiln, and covered with turf; or they are placed in a conical cavity dug in the ground, and piled up in large stacks, which are covered with turf, with spaces left for air to pass, to keep up combustion. Fire is then applied to the top of the pile, and it is suffered to burn downwards with a slow smothered flame, which continues for ten or twelve days: during this time the tar is formed by the decomposition of the resinous juice; it flows to the bottom, and runs out, through a small channel cut for the purpose, into barrels. The stacks are generally built on the slope of a hill, so that the tar can be easily collected, and put into barrels; in which state it is brought to this country. The roots yield the greatest quantity of tar.

Pitch is condensed tar, procured by evaporation—five barrels of tar yield two barrels of pitch. When this is procured by distilling the tar in close vessels, the volatile oil is procured, and sold under the name of "oil of tar." [1]

Both *tar* and *pitch* are compounds of resin, empyreumatic oil, pyroligneous acid, and charcoal.

2. PINUS LARIX, LARIX EUROPEA.[2]

Officinal. TEREBINTHINA VENETA, *Edin.* Liquid resinous exudation of Abies Larix. Venice Turpentine.

Syn. Térébinthe de Vénise, T. de Meleze (*F.*), Venetischer Terbenthin (*G.*), Trementina Veneta (*I.*), Trementina de Venecia (*S.*), Terebenthina pina (*Port.*), Wenedisk terpentin (*Swed.*), Venedisk terpentin (*Dan.*), Venitsianskie terpentin (*Russ.*).

There are two varieties of the larch tree, one of them a native of America, the other of the Alps of Italy and other parts of the South of Europe, Germany, and Siberia. They rise erect to the height of fifty feet in northern climates, but in the South to

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[1] Besides the Pinus *sylvestris*, P. *maritima*, P. *Tæda*, and P. *australis*, which yield all the products above described; they are also procured from Pinus *pinea*, P. *pumilio*, and *P. Cembra*.

[2] Πίτυς Theophrasti. *Lärchenbaum* (G.), *Lorkenboom* (Dutch), *Lerketræ* (Dan.), *Meleze* (F.), *Larice* (I. S.), *Larico* (Port.), *Listweniza* (Russ.). The larch tree has been cultivated in England since 1629.—*Hort. Kew.*

upwards of 100 feet, sending off slender, spreading branches, which droop at their extremities. The buds are alternate, perennial, and cup-shaped, scaly; and each producing annually a tuft of numerous, spreading, linear, entire leaves, which are deciduous, soft, and of a bright green colour; the tufts generally contain forty or more leaves, springing from short, thick, corrugated sheaths, and spreading like a painter's brush. The *male* flowers, which appear in April, are yellow, in small, lateral, cylindrical catkins, with the apices of the anthers inflated; the *female* are in erect, ovate catkins, twice as large as the male, and in some instances pink at the top: the strobiles or cones are about an inch long, obtuse, and purplish at the apex, when young, with the scales smooth on the surface, lacerated at the edges, and concealing under each scale two winged seeds.

The larch tree grows to very great perfection in the forests of Baye in Provence, where a very large proportion of the Venice turpentine of commerce is procured. It is obtained by boring a hole with an auger into the heart of the tree, at about two feet from the ground, and fitting into it a small pipe, through which the turpentine flows slowly into vessels placed for its reception. The process is begun in May, and continued till September; when the different quantities collected are put together, and purified by straining through cloths or hair sieves. No trees under twelve inches in diameter are tapped; but vigorous trees will yield, annually, seven or eight pounds for forty or fifty successive years, or during the term of their life.[1] Much of the Venice turpentine of the shops is brought from America, and is perhaps procured from a different species of fir.

The *volatile oil* is separated from it by distillation in the same manner as from the common turpentine.

3. PINUS BALSAMEA.[2] ABIES BALSAMEA.

Officinal. BALSAMUM CANADENSE, *Edin.* Fluid resinous exudation of Abies Balsamea. Canada Balsam.

Syn. Baume de Canada (*F.*), Kanadischer balsam (*G.*), Canadisk terpentin (*Dan.*), Trementina d'America (*I.*).

This tree is a native of the coldest regions in North America, flowering in May. It is a straight, elegant tree, rarely exceeding

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[1] Besides turpentine, the larch tree exudes a species of *manna*, which is named Briançon manna. It is in little white concrete drops, which adhere to the leaves, and taste sweet like new honey; but they have the flavour of turpentine, which they contain. The inner part of the tree yields also a gum similar in its properties to acacia gum, of a reddish colour, with a slight resinous taste; it is perfectly soluble in water. In Russia it is officinal, and sold, as Pallas observes, under the improper name of *Orenberg gum*, being obtained from the Uralian Forest.— *Flora Rossica*, i. pp. 2, 3.

[2] *Balsamtanne* (G.), *Le beaumier de Gilead* (F.)

40 feet in height, and 12 or 15 inches in diameter, covered with a smooth whitish-grey bark. The leaves are in double rows, like a comb, short, not exceeding 8 lines in length, and linear, but broader than the former two species, and less pointed, of a bright green colour on the upper surface, marked with whitish lines underneath, and fragrant: the cones, which ripen in October, stand erect on the branches, are large, nearly cylindrical, of a beautiful, deep, glossy, purple colour, inclining to black; and exude a great quantity of transparent resin, which gives them a very rich, beautiful appearance.[1]

The manner in which the Canada balsam or fine turpentine, yielded by this tree, is collected, is by incisions into the body of the tree from which it exudes, and breaking the vesicles which form spontaneously on the tree. These vesicles exist in great quantity between the wood and the bark. Canada balsam is brought to this country in casks, each containing about one hundred weight.

4. PINUS ABIES.[2] ABIES EXCELSA.

Officinal. *a.* THUS, *Lond. Dub.* Frankincense. The turpentine exuded from the bark of Abies excelsa and Pinus Palustris, and hardened in the air, *L.* From Pinus Abies, *D.*

β. PIX BURGUNDICA, *Lond. Edin. Dub.* Burgundy Pitch. Impure resin prepared from the turpentine of Abies excelsa, *L.* Concrete resinous exudation, probably in a great measure from Abies excelsa, *E.* From Abies excelsa, *D.*

The Norway spruce fir is a native of the north of Europe, and of the moist parts of Northern Asia, flowering in May. It is a lofty, noble tree, rising from 150 to 200 feet in height, and from three to five feet in diameter; it is straight, pyramidal, and covered with a reddish scaly bark. The leaves are short, thickly set upon the branches, slightly carinated on both sides, of a dusky green colour, shining on the upper surface, and often curved; the male catkins are ovate, purplish, and scattered in the axils of the leaves; the female are also purple, and generally terminal; the strobiles or cones are long, nearly cylindrical, greenish before they are ripe, but afterwards purple, and always pendent; the scales, which are arranged in eight spiral rows, have an oval shape, terminating in a point, and become ragged at the edges.[3]

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[1] Canada *Balsam,* as it is improperly named, is also the production of Abies *Canadensis,* Hemlock Spruce.

[2] Ἐλάτη Theophrasti. *Die Fichte* (G.), *Hartsboom* (Dutch), *Gran* (Dan., Swed.), *La Pesse* (F.), *Picea* (I., S.), *Peuce* (Port.), *Jel* (Russ.). This species of fir is cultivated in Britain, but it does not appear to have been introduced before 1739. When grown in Norway it is used for masts; but that which is cultivated in Britain is used only for the coarsest purposes.

[3] Like the Scotch fir, it is attacked by the Bostrichus *piniperda.*

Thus or *Frankincense* exudes spontaneously from the bark of the Norway spruce fir, and concretes as it exudes. It undergoes no preparation, but is brought to us in the form of tears or masses, packed in casks, each containing from one to two hundred weight. The greater part comes from Germany; but a small quantity of a purer description comes from France. It will be seen above, that the London College refers Thus to the Pinus Palustris, as well as Abies excelsa; this exudation would be nothing but common turpentine made dry and brittle by exposure.

Burgundy pitch is obtained by making incisions through the bark, so as to lay bare the wood: or from Thus by fusion and expression. It concretes when procured from incisions, in the form of flakes at the incisions, which are detached by an iron instrument, once a fortnight during the summer, and fresh incisions successively made. The flakes, after being detached, are put into large boilers with a sufficient quantity of water, melted, and then strained through coarse cloths under a press. The greatest quantity is collected in the neighbourhood of Neufchatel, whence it is brought to this country, packed in casks. A fictitious sort is made in England, and found in the shops under the title of *common* Burgundy pitch. It may be distinguished by its friability, want of viscidity, and unctuosity, and the odour which characterises the genuine sort.

Qualities.—TURPENTINES.—Although these are produced from different species of the Pine tribe, and one sort from the Pistacia *terebinthus*, yet all of them possess the same general physical and chemical properties. They have a peculiar, somewhat aromatic odour, and a warm, pungent, bitterish taste: are semifluid, tenacious, translucent, combine readily with fixed oils and are inflammable, burning with a white flame and much smoke. Alcohol and ether dissolve them entirely, leaving the impurities; but water takes up only their flavour. When distilled with water a volatile oil comes over, and towards the end of the operation succinic acid rises[1]; resin remains in the retort; the turpentines therefore are compounds of these three substances. They are partially saponified by solution of pure potassa: but a part of the resin and the greater part of the volatile oil remain unchanged. Each sort of turpentine has characteristic qualities which require to be noticed. 1. *Common Turpentine* has a strong, somewhat fragrant odour, and a bitter, disagreeable taste; its consistence is greater than that of honey; its colour is dirty yellow, and it is more opaque than the other sorts. Strasburg turpentine, according to Caillet, consists of 53·5 of *volatile oil*, 6·2 *resin*, 10·8 *abietin*, 46·4 *abietic acid*, and 0·9 of *succinic acid*. 2. *Venice Turpentine* is more fluid,

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[1] *Annales de Chim.* xxi. 328.

having the consistence of new honey, a yellowish colour, and is less unpleasant to the smell and taste than the common. 3. *Canadian Balsam* (or more correctly *Turpentine*) has a strong, not disagreeable, odour, and a bitterish taste; is transparent, whitish, and has the consistence of copaiva. 4. *Chian* or *Cyprus Turpentine* (see *Pistacia*) is very fragrant, but almost insipid, nearly transparent, thick, tenacious, and of a whitish colour.

Oil of turpentine has a strong, penetrating, peculiar, odour, and a hot, pungent, bitterish taste. It is perfectly limpid and colourless: extremely light, volatile, and inflammable; it congeals at $+14°$ Fahr., its boiling point is $312°$ Fahr.: it dissolves completely in six parts of sulphuric ether; but although hot alcohol readily dissolves it, yet it again separates in drops as the spirit cools, and is very sparingly soluble in the cold in the strongest alcohol: one hundred parts in volume, however, unite with twenty of alcohol, and form a homogeneous solution, which does not become turbid by water.[1] In all other respects it agrees with the other volatile oils. Its formula is $C_{20}\,H_{16}$. In this state it is named *Camphene*. When a stream of hydrochloric acid gas passed through it, a crystallized mass is formed, which is regarded as artificial camphor. It consists of a solid matter which is the camphor; and a fluid, which differs from the former only in being liquid. Formula $C_{20}\,H_{16}$, H Cl. I found that an imperfect camphor is also formed when a stream of oxygen gas is passed through the *pure* oil of turpentine.

Tar has a strong odour, familiar to every person; a resinous, subacid, bitterish taste; and a coarse, thick consistence, with a deep brown colour, approaching to blackness, derived from the charring of the wood during its formation. It consists principally of empyreumatic oil, resin, and acetic acid; is partially soluble in water; and is inspissated by boiling into pitch. In the empyreumatic oil, many substances have been found by Dr. Reichenbach, amongst which are Creasote, Paraffine, Eupione, Picamer, &c. &c.

Yellow and *white resin* are varieties of the same substance. They are nearly inodorous when cold; but, when heated, emit a slight terebinthinate odour. Their taste is slightly acrid and bitterish; and their colour a dull whitish yellow, or a greenish yellow. The mass of resin is semipellucid, brittle, breaks with a true vitreous fracture, and adheres moderately to the fingers. Its specific gravity is 1·0742. It melts when heated, then inflames, and burns with a yellow flame, giving out much smoke. It is insoluble in water, but entirely soluble in alcohol, ether, the fixed oils, and the alkalies. The mineral and the acetic acids also dissolve resin, and the nitric converts it into artificial tannin. When sulphuric acid is employed, charcoal, in the proportion of forty-

[1] Ure, *Phil. Trans.* 1822.

three per cent. of the resin acted on, is produced.[1] Resin consists of at least two acids, isomeric, but distinguished from each other by their different solubilities in alcohol; the one soluble in cold alcohol is called *Pinic* acid; the other *Sylvic* acid. Their formula is $C_{40}\ H_{30}\ O_4$. Another acid occurring in resin and produced by the action of heat on the above acids, is called *Colophonic* acid, to which the brown colour of common resin or *rosin* is due. It is very sparingly soluble in alcohol. The *resin of the Norway Spruce* possesses nearly the same properties. It is in the form of solid brittle tears, of a brownish-yellow colour on the outside, and internally white: and emits a very agreeable odour when burning.

Burgundy pitch has a terebinthinate odour and taste, is brittle, opaque, and of a light yellow or reddish-brown colour. It softens moderately in the heat of the hand, appears unctuous, and has a considerable degree of tenacity.

Medical properties and uses.—The *Turpentines* and their *essential oil* are stimulant, cathartic, diuretic, anthelmintic and externally rubefacient. Of those which I have described the Venice and Canada turpentines are more generally employed for internal purposes; the common turpentine proving offensive to most stomachs, and the Chian not being easily procured. The ancients were well acquainted with the medicinal properties of turpentines[2]; and, besides the diseases for which they are prescribed by the moderns, they gave them liberally in coughs and in all pulmonary affections—a practice not to be followed. Turpentines seem to derive their virtues from the volatile oil which they contain. When applied to the skin, they excite the cutaneous capillaries, cause redness, and often vesication. When swallowed, they produce a sensation of warmth in the stomach, at first increasing the quickness and force of the pulse, but afterwards diminishing it; and if the dose be large, some degree of nausea is excited, with slight vertigo, and soon, but not always, a copious discharge from the bowels; but if the dose be small, they act chiefly upon the kidneys. The cathartic operation of large doses of the oil, in particular, seems to counteract the determination to the kidneys, which smaller doses produce; for, in doses of even f ʒ x. and f ʒ xij., no other effect on the urinary organs is perceived than the violet smell of the urine.[3] The odour of violets is produced by the oil, even when it is neither taken into the stomach, nor rubbed upon the skin; for if a quantity of oil of turpentine be poured on a table in a room, this odour will be perceived in the

[1] Hatchett, *Phil. Trans.* 1806.

[2] See *Dioscor.* lib. i. cap. 91. p. 50. *Aretæus, passim. Alpinus de Med. Egypt.* lib. iv. &c.

[3] *Transactions of the London Medical Society*, i. part i. 212. 227.

urine of any one who remains in the room for half an hour, or even a shorter time. When breathed, it is perceptible in the urine in fifteen minutes; and when rubbed on the skin, in twenty-five minutes.[1]

Turpentines are chiefly prescribed in gleet, leucorrhœa, mucous obstructions of the urinary passages, and calculous affections; but in the latter cases their stimulant operation on the kidneys requires that they be given with caution. They are also prescribed in old catarrhs, in mucous diarrhœa, in colic, and in flatulent distension of the bowels. The oil is justly regarded as a useful remedy in lumbago, sciatica, and some other varieties of chronic rheumatism, and in neuralgia, particularly when combined with the cinchona bark. Dr. Copland, in a valuable paper on terebinthinous remedies[2], recommends the oil strongly in the hæmorrhagiæ, particularly in atonic epistaxis and hæmoptysis. He also confirms Dr. Percival's statement of its efficacy in symptomatic epilepsy; and extols its powers in infantile convulsions, arising from a disordered state of the alimentary canal, and from erysipelas. It exerts a powerful influence on the uterine organs; and thence is useful in chlorosis. Dr. Copland mentions some cases of ovarian dropsy, in which the effects of the oil were such as to recommend its employment in incipient cases of this disease; but I have never seen any benefit accrue from its use, and I cannot perceive any advantage which can be derived from it in any description of encysted tumour. In other dropsies it may sometimes prove useful, but not in hydrocephalus, in which it has been prescribed. Our experience is adverse to these opinions. Dr. Cheyne says, in melæna, a disease which depends upon an excited state of the capillaries, "I have given oil of turpentine with complete success." From its action in the abdominal viscera, it has proved useful in symptomatic epilepsy. It has proved beneficial administered in doses of f ʒ j. in inflammation of the iris and choroid coat of the eye[3], especially when these are connected with a gouty diathesis.

For the expulsion of the tape-worm the power of the oil of turpentine is now generally known. It differs in its action from the other remedies which have been employed against tape-worm, by killing the worm before its expulsion; and consequently it is more permanently useful. Neither wine nor spirits should be drunk during the use of the oil, which itself causes intoxication; the usual quantity of food should be diminished, and the use of the oil

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[1] *Journal Complémentaire*, Oct. 1826.

[2] *Med. and Phys. Journ.* vol. xlvi. pp. 185. 206.

[3] *Lond. Med. Gazette*, iv. 509.

[4] In all the cases of the expulsion of tænia by oil of turpentine, the ejected worm has generally had a livid hue, without any appearance of animation.

should be immediately discontinued, if an eruption resembling eczema appear on the skin, which is apt to arise from its employment in some habits. The larger the dose the less likely is it to cause strangury. As local stimulants, turpentines and the oil of turpentine have been efficaciously exhibited in the form of enema, in cases of colic, obstinate costiveness, and ascarides. The oil is useful when diluted with olive oil and dropped into the ear in deafness from defect of wax; and it is an excellent addition to embrocations in acute rheumatism, where embrocations are admissible; and in bruises and paralysis of the extremities. As a discutient, it is applied to indolent tumours, and as a useful primary application to burns; but it is now seldom used, cotton and pressure being generally employed. In peritoneal inflammation I have seen the greatest relief procured by the topical use of oil of turpentine, combined with tincture of opium, rubbed upon the abdomen.

Turpentines are given in doses of grs. x. to ʒj., either made into pills with powdered liquorice-root, or diffused in water by means of almonds, mucilage, or yolk of egg and sugar. The dose of the oil may be ♏x. to ʒj. to produce its diuretic effect: but in doses of fʒj. to fʒij., its effects are more general on the system. In these doses, it may be combined with aromatics and spices, and rubbed up with mucilage or honey. Dr. Copland recommends the addition of the tincture of capsicum, for correcting the nauseating and unpleasant effects which the oil frequently produces on the stomach. For the expulsion of tænia, it is necessary to give from f℥ss. to f℥ij. of the oil, repeated every eight hours till the worm be ejected: and in these large doses it is more easily taken when exhibited uncombined, or when merely floated upon water with the addition of a drop or two of any aromatic oil. If it do not operate by stool in four or five hours after it has been taken, a dose of castor oil should be exhibited.

Tar is stimulant, diuretic, and sudorific; and externally detergent. In the solid state, made into pills, it has been beneficially used in ichthyosis; but it is more generally employed in the form of tar water. As an external application, it has been found beneficial in Porrigo scutulata, Lepra, Psoriasis, and foul ulcers, and some other cutaneous diseases.

The *Resins* and *Burgundy pitch* are adapted for external use only; the former entering into the composition of some ointments and plasters; the latter being used as a rubefacient plaster. The Burgundy pitch excites some degree of inflammation, sometimes a pimply eruption, and a purulent exudation, from the part over which it is applied, without raising the cuticle. It is used in cases of catarrh, pertussis, dyspnœa, and chronic rheumatism; and seems to be chiefly serviceable from the length of time it adheres to the skin, and by which its action is continued.

Officinal preparations.—Of Turpentine: *Oleum Terebinthinæ purificatum*, E.—Of the oil: *Linimentum Terebinthinæ*, L. E. D. *Enema Terebinthinæ*, L. E. D. *Confectio Terebinthinæ*, D.—Of Yellow Resin: *Emplast. Resinæ*, L. D. *Emplastrum Resinosum*, E. *Ceratum Resinæ*, L. *Unguentum Resinosum*, E. *Unguentum Resinæ*, D.—Of Thus: *Thus præparatum*, L.—Of Burgundy Pitch: *Pix Burgundica præparatum*, L. *Emplast. Picis*, L. E.—Of Tar: *Unguentum Picis liquidæ*, L. E. D.—Of Pitch: *Unguentum Picis*, L.

PIPER. *Spec. Plant. Willd.* i. 159.

Cl. 2. *Ord.* 3. Diandria Trigynia. *Nat. ord.* Piperaceæ.

G. 74. *Calyx* none. *Corolla* none. *Berry* one-seeded.

Sp. 1. P. *nigrum.* Black Pepper. *Med. Bot. 3d edit.* 721. *t.* 246. Molago-Codi. *Rheede, Hort. Malabar.* vii. 23. *t.* 12. *Marsden*, p. 105. *Roque*, 176. *Nees von Essenbeck*, 21.

Sp. 3. P. *Cubeba.* Cubebs. *Sketches Civil and Military of Java.* Cubeba officinalis (*Miguel*).

Sp. 12. P. *longum.* Long Pepper. *Med. Bot. 3d edit.* 724. *t.* 247. Cattu-tirpali. *Rheede, Hort. Malabar.* vii. 27. *t.* 14. *Nees von Esenbeck*, 23.

1. PIPER NIGRUM.[1]

Officinal. PIPER NIGRUM, *Lond. Edin. Dub.* Black Pepper. The dried unripe berries or immature fruit.

Syn. Le Poivre commun, Poivre noir (*F.*), Schwarzer pfeffer (*G.*), Gemeene peper (*Dutch*), Swarteller Stark peppar (*Swed.*), Sort peber (*Dan.*), Peretstechernoi (*Russ.*), Pepe nero (*I.*), Pimienta nera (*S.*), Pementa negra (*Port.*), Mame (*Japan.*), Molago-Codi (*Malabar*), Kali mirchal (*Beng.*), Fulful-filfil (*Arab.*), Meerch (*H.*), Maricha (*San.*), Mallaghoo (*Tam.*), Gummeris (*Cing.*), Lada (*Malay*), Maricha (*Jav.*).

This species of pepper is a native of the East Indies; and is very abundantly cultivated at Malacca, Java, and Sumatra, whence the greater part of Europe is supplied. The French introduced the culture of the pepper into Cayenne in the 18th century, and succeeded. This Piper is a climbing, or rather radicating, plant, the stem being round, smooth, jointed, and swelling towards each joint, woody, slender, branched, and from eight to twelve feet in length. The leaves are petiolate at the joints of the branches, cordate, entire, pointed, seven-nerved, and of a dark-green colour. The flowers are diœcious, sessile, whitish, or glaucous, small, each supported by a scale: they cover, thickly, a cylindrical spadix, without any regular calyx or corolla. The filaments are two or more, flat, awl-shaped; and the anthers roundish. The germen is ovate, and crowned with a deeply divided stigma: the fruit is, strictly speaking, a nut, resembling a globular berry: it is at first green, changing as it ripens to a bright-red colour.

In Sumatra, the pepper vines are propagated by cuttings or

[1] Πεπερι Dioscoridis.

suckers. The natives choose for their pepper gardens a level piece of ground, moderately elevated, covered with young wood, which they burn down. These gardens are generally near the banks of rivers. Whilst growing, the pepper vines are supported by props, called *Chinkareens*, which are plants of Morinda *citrifolia*, or of an Erythrina, at the root of each of which two pepper vines are planted, and into the bark of which the vines send radicular claws, by which the shoots are supported; but whether any nutriment is taken up by these from the living props is uncertain.[1] At Borneo, poles instead of chinkareens are used; but Marsden says the latter are preferred, both because they last as long as the pepper vines, and their top branches, which are not lopped off, shade the vines. An argillaceous soil is the best. The plants are three years old before they bear fruit, and they bear for eight years. After the seventh year, when the plant is considered in its prime, it continues in full bearing for three or four years, and then declines. "Fruit," says Marsden, "has been gathered from some at the age of twenty years, but such instances are uncommon." The berries are four or five months in coming to maturity; are gathered as soon as any of them redden; but the best pepper is gathered green, if it be of full size. It is then spread upon mats to dry, and trodden to separate the fruit from the stalk; when it becomes black, and more or less shrivelled. In good seasons each vine yields about fifty pounds of pepper. The vines yield two crops yearly; the first in September, the second in March. White pepper is the fruit freed of its outer coat by means of a preparation of lime and mustard oil, called *chinam*, applied before it is dried.

The pepper plant is now cultivated to a considerable extent in British India. If the pepper be not of a proper age when gathered, it shrivels greatly, and, on removal from place to place, falls into dust. Advantage is taken of this fact to ascertain the proper time of gathering the fruit; for, if the pepper have been gathered too soon, it may be almost reduced to dust by rubbing it between the hands, but if it be of mature age, and sound, no effect is produced on it by the friction. When it is over-ripe, and has fallen to the ground, the usual exterior coat falls off; and the pepper becomes an inferior white pepper.

Qualities.—Black pepper is round, about the size of a small pea, corrugated on the surface; internally hard, whitish. It has an aromatic odour, and a hot, pungent taste. Its virtues are en-

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[1] Dr. Roxburgh began the cultivation of black pepper in the Circars in 1787. The prop trees he used were the moochy-wood tree, Erythrina *corallodendron*. The French also found that this species of Erythrina and the Crescentia *cujete* are the only props to which the pepper takes kindly, and on which the fruit ripens.—Vide *Ann. du Mus. d'Hist. Nat.* t. i. p. 88. One thousand plants yield from 500 lbs. to 1000 lbs. of pepper.

tirely extracted by ether and alcohol, and partially by water. The aqueous infusion is brown, and reddens vegetable blues; and the decoction forms a precipitate with infusion of galls, which dissolves again when the fluid is heated to 120°. When the alcoholic infusion is distilled, a green, resinous, oily matter is left, which appears to be the source of the odour and the taste of the pepper. M. Pelletier[1] ascertained, that when this green fatty matter is washed in warm water, and again dissolved in hot alcohol, it deposits, after some days, a number of small crystals, which, when purified, are insipid, and have the property of imparting a blood-red colour to strong sulphuric acid; a greenish yellow, which becomes orange, and afterwards red, with nitric acid; and the same with the hydrochloric. This substance M. Pelletier named *piperin:* it crystallizes in four-sided rhomboidal prisms, of which the two opposite sides are broadest: the prism is terminated by an inclined face. The crystals are nearly colourless, or pale yellow, semi-translucent, tasteless; fusible, but not volatile; insoluble in cold water; sparingly in hot water; but soluble in alcohol, ether, and acetic acid. The formula for Piperin is $C_{34}\ H_{19}\ N\ O_6$. Pelletier[2] found in pepper the following components: — *Piperin; a very acrid, concrete resin,* on which the acrimony of the pepper depends; a *volatile oil,* which is colourless, and the formula of which is $C_{10}\ H_8$; a *gummy coloured matter; extractive; malic* and *tartaric* acids; *starch; lignin;* and *earthy and alkaline salts.* Ether digested on powdered pepper takes up three parts in ten; and, when evaporated on water, deposits an intensely hot, biting, yellowish, oleo-resin, with the odour of the pepper, and insipid extractive matter. Luca found no piperina in white pepper; but I found traces of it in treating it in the same manner as black pepper. Luca's analysis of white pepper is thus stated: — 16·60 *acrid resin;* 1·61 *volatile oil;* 12·50 *extractive* and *salts;* 18·50 *starch;* 2·50 *albumen;* 29 *woody fibre;* 12·29 *water* and *loss* = 100·00.[3]

Black pepper, as sold in powder, is generally adulterated; often with the powdered husks of mustard, which are openly sold by the makers of mustard for this purpose, under the title of P.D. (*Pepper dust*).

Medical properties and uses. — Black pepper is stimulant and

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[1] *Annales de Chim. et Phys.* xvi. p. 20.

[2] Dr. Meli has proposed the following method of procuring pure piperin. Digest lb. j. of black pepper, powdered, in O jss. of alcohol at 36°, in a gentle heat. Then raise it to ebullition; after which leave it to cool; and having poured off the fluid, repeat the operation with a fresh quantity of alcohol. Pour upon the mixed tinctures O j. of distilled water and f℥jss. of hydrochloric acid. A fatty precipitate will fall down, which should be separated by filtration. The crystals which will form on the sides of the vessels and on the filter are pure piperin. Adding water till a precipitate ceases to be produced, a fresh quantity is obtained. — *Ann. Univ. di Med.* t. 27. I may add that piperin crystallizes freely in the above fatty matter, when it is left exposed to the air for some days.

[3] Schwartze, *Pharm. Tabellen,* quoted by Dr. Pereira, *Elements of Mat. Med.*

carminative. Its excitant property is demonstrated by its rubefacient effect, when it is applied to the skin. Its use, as a condiment, has been long[1] well known; and although in general it is useful to those who have a weak digestion, yet, even in small quantities, it proves injurious in inflammatory habits, and to those subject to piles[2]; and when swallowed in large quantity, it excites inflammation of the mucous membrane. As a medicine, pepper is found sometimes serviceable in checking nausea and vomiting, and removing hiccough. It is also used as a stimulant in retrocedent gout, and in palsy. The watery infusion forms a useful gargle in relaxation of the uvula. The *piperin* which it yields has been employed successfully by Dr. Melli, and several Italian, French, and German physicians, and also in this country, in intermittents and other fevers: and is said to be as efficacious as the preparations of Quina: but this assertion still requires confirmation. Pure *piperin* is a less powerful antiperiodic than when it is combined with a portion of the acrid volatile oil in which it crystallizes. A tincture of pepper made with gin, or with rum, has long been a popular remedy for agues. The fixed acrid oil, out of which the piperin crystallizes, is the best stimulant in relaxation of the uvula that I know. It must be applied with a hair pencil.

The dose of black pepper may be from grs. x. to ℈ j.

Officinal preparations. — *Confectio Piperis nigri*, L. D. *Electuarium Piperis*, E.

2. PIPER LONGUM.

Officinal. PIPER LONGUM, *Lond. Edin.* Long Pepper. The immature fruit. Dried spikes.

Syn. Poivre longue (*F.*), Langez pfeffer (*G.*), Lange peper (*Dutch*), Lang peppar (*Swed.*), Perets dlinnoi (*Russ.*), Pepe lungo (*I.*), Pimīenta lunga (*S.*), Pimenta lunga (*Port.*) Darfilfel (*Arab.*), Pipel (*H.*), Tipilīe (*Tam.*), Pippāli (*San.*), Filfili daraz (*Pers.*), Tabee (*Malay*), Chabijawa (*Jav.*).

This plant is a perennial, a native of Malabar and Bengal. The stems are round, smooth, branched, slender, and scandent: the leaves are commonly ovato-cordate, pointed, five-nerved, coriaceous, and of a deep-green colour: the flowers are small, in dense, short, terminal spikes, nearly cylindrical. In other circumstances the fructification agrees with the former species. The fruit consists of very small one-seeded berries or grains imbedded in a pulpy matter, forming what Mirbel terms "*serose.*"

The fruit is hottest in its immature state, and is, therefore,

[1] In the reign of Edward IV. grocers were termed pepperers.

[2] It nevertheless is an ingredient in a nostrum for the cure of piles, namely, *Ward's Paste*, which consists of lb. j. of black pepper and elecampane, lb. jss. of fennel-seeds, and of honey and sugar each lb. j. beaten together and well mixed in a mortar. The dose is the size of a nutmeg three times a day.

gathered while green, and dried in the heat of the sun. It is imported in the entire spikes, which are about one inch and a half long, and indented on the surface.

Qualities. — Long pepper has a weak, aromatic odour, an intensely fiery, pungent taste, and a dark-grey colour. Its constituents appear to be similar to those of black pepper. Ether, digested on powdered long pepper, takes up two parts and a half in ten parts, and when evaporated on water deposits a resin less hot than that of black pepper, but more permanent, and a smaller proportion of extractive. According to an analysis of Dulong, the constituents of long pepper are a *concrete fatty matter* in which the pungency and acrimony reside, a small portion of *volatile oil, piperine, extractive,* a coloured *gummy matter, starch,* a large quantity of *bassorin,* a *malate,* and some other saline substances.[1]

Medical properties and uses. — The same in every respect as those of black pepper.

It is contained in several officinal preparations.

3. PIPER CUBEBA, or CUBEBA OFFICINALIS (*Miguel*).

Officinal. CUBEBA, *Lond. Edin. Dub.* Cubebs. The immature fruit of Piper Cubeba. The stalked fruit. The berries of Cubeba officinalis.

Syn. Cubebes (*F.*), Kubeben pfeffer (*G.*), Kobeben (*Swed.*), Cubiber (*Dan.*), Koebeben (*Dutch*), Perets kubeba (*Russ.*), Pepe Cubeba (*I.*), Cubebas (*S.*), Cobibas (*Port.*), Cubab chinie (*Hind.*), Komuchus (*Batavian*), Val Mellaghoo (*Tam.*), Duncke mirchie (*Duk.*), Komoonkoos (*Malay*), Salavamirrialoc (*Til.*), Kebabeh (*Arab.*), Walgummeris (*Cing.*). Sirgandha marichum (*Sans.*), Kumukus (*Jav*).

The plant which yields this spice is a native of Java, Prince of Wales's Island, Nepaul, Batavia, Guinea, and the Isle of France. The younger plants differ from the older: their branches are long, creeping, and rooting; their leaves cordato-lanceolate, attenuated, about one and a half inch in length, and supported on petioles the length of the leaf. In the older plants the branches are flexuose and tetragonous; the leaves are less than an inch in length, unequal at the base, and supported on channelled footstalks half an inch in length. The fruit is a berry growing in clusters.[2] According to Blume, another species of cubebs, named by Miguel Cubeba Canina, furnishes a portion of the cubebs of commerce.

Cubebs are brought to this country packed in cases. The best are about the size of white pepper, round, plump, rough, and heavy. They have a short stalk attached to each, which appears to terminate in raised veins on the surface of the berry.

Qualities. — Cubebs when chewed have a pungent, aromatic,

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[1] *Journ. de Pharm.* Février, 1825.

[2] *Medical Repository,* Dec. 1820, p. 523.

slightly bitter taste; which, however, leaves a sensation of coolness on the palate resembling that which is produced by peppermint. Their odour is fragrant and agreeable. According to Vauquelin[1], cubebs contain a volatile, almost concrete oil, a resin resembling that of copaiva, another coloured resin in small quantity, extractive, and some saline substances. Soubeiran and Capitaine found in it a crystallizable principle, *cubebin*, neutral, tasteless and sparingly soluble in water. The latest analysis is that of Monheim, who states the following to be the constituents of cubebs: — 2·5 *green volatile oil*, 1·0 *yellow volatile oil*, 4·5 *cubebin*, 1·5 *balsamic resin*, 3·0 *wax*, 1·0 *chloride of sodium*, 8 *extractive*, 65·0 *lignin*, loss 15·5 = 100·0.[2] It seems probable that *Cubebin* and *Piperin* are identical. In our analysis we find that there are two *volatile oils;* one *concrete* in small quantity, the other *fluid*. They are readily obtained by distillation. The fluid oil has a density 0·929; its formula is $C_{10}\ H_8$; it is almost colourless when pure, and has the odour and taste of the cubebs. The colour of the powder is darker than that of the berries. It should be kept in well-corked bottles, and should even be dispensed in stoppered phials, as it quickly loses its active part when it is kept in paper. It is often adulterated with pimenta, which may be detected by the odour.

Medical properties and uses. — Cubebs are diuretic and slightly purgative. In gonorrhœa and gleets they have been long used by Oriental practitioners, and the Arabs employ them in seasoning food.[3] They have been found beneficial in this country in gonorrhœa, in which they moderate the inflammation, and consequently the discharge: this effect is soon apparent; and unless it be so, the remedy is seldom useful.

The following statement of the results of fifty cases treated by Mr. Broughton gives some idea of the time in which cubebs produce their effects, and of their value as a remedy in gonorrhœa: —

"Patients cured in from		two to seven days	-	10
-	-	eight to fourteen	-	17
-	-	fifteen to twenty-one	-	18
-	-	twenty-two to thirty	-	1
-	-	fifty-five days	-	1
Patients in whom no sensible effects were produced				3
			Total	50"[4]

Mr. Jeffrey[5] says that, even when they failed, he found the

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[1] *Ann. Phil.* 2d Series, iii. 202.
[2] *Journ. de Pharm.* xx. 403.
[3] Martyn's Gardener's Dict. art. Piper.
[4] *Medico-Chirurg. Trans.* vol. xii.
[5] *Pract. Observ. on the Use of Cubebs in Gonorrhœa.* Lond. 1821.

symptoms afterwards yield readily to copaiba; an observation which is confirmed by our own experience, and that of Mr. Broughton. They have also been lately given with advantage in inflammation of the mucous membrane of the intestines; and M. Velpeau has found them most beneficial in leucorrhœa. The oil separated by distillation has been used instead of the fruit; but it is less efficient.

The powder, which is the best form in which cubebs can be administered, sometimes nauseates: it acts as a diuretic in large doses, imparts an odour to the urine, and gives a cool sensation to the rectum in passing the fæces. It sometimes, also, produces a quick pulse, a burning heat in the palms of the hands and the soles of the feet, flushing of the face, head-aches, and frequently a slight degree of giddiness; occasionally urticaria; and, according to Dr. Duncan's experience, it has also produced swelled testicles.[1] The dose of the powder is from ℈j. to ʒ ss. or ʒj. three times in the day. Of the tincture ʒ ss. may be given in a glass of water three times a day. The oil may be administered in doses of ♏ xij. as an oleo-saccharum.

Officinal preparations.—*Tinctura Cubebæ,* L. D. *Oleum Cubeba,* E. D.

PISTACIA. *Spec. Plant. Willd.* iv. 752.

Cl. 22. *Ord.* 5. Diœcia Pentandria. *Nat. ord.* Anacardiaceæ.
G. 1782. *Male.* *Calyx* five-cleft. *Corolla* none.
——— *Female.* *Calyx* three-cleft. *Corolla* none. *Styles* three. *Drupe* one-seeded.
Species 4. P. *Terebinthus.* Chian Turpentine-tree. *Med. Bot. 2d edit.* 29. *t.* 12. *Du Hamel, Arbres,* ii. *t.* 87.
Species 6. P. *Lentiscus.* Mastich-tree. *Med. Bot. 3d edit.* 26. *t.* 11. *Du Hamel, Arbres,* ii. *t.* 136. *Hayne,* xiii. 20.

1. PISTACIA TEREBINTHUS.[2]

Officinal. TEREBINTHINA CHIA, *Lond. Edin.* Chian Turpentine. Liquid resinous exudation of Pistachia Terebinthus.

Syn. Térébenthine de Chio (*F.*), Zyprischer Terebinthin (*G.*), Trementina de Cipro (*I.*).

The tree which yields the Chian turpentine is a native of Barbary, Syria, and the Grecian Archipelago. It is cultivated in the islands of Chios and Cyprus, and also bears the severity of our climate: where, however, it is cultivated only as an ornamental

[1] *Edinburgh Dispensatory,* 1830.
[2] Τέρμινθος, Dioscoridis. *Der Terpentinbaum* (G.), *Terpentintrae* (Dan.), *Le Térébinthe* (F.), *Il Terebinto* (I.), *Cornicabra* (S., Port.), *Skipidarnoe derewo* (Russ.).

tree, flowering in June and July. It is not a high tree, seldom exceeding thirty feet in stature, sending off many spreading branches, and is covered with a smooth bark: the leaves are pinnate, composed of three pair of lanceolate, ovate, veined, entire leaflets, with a terminal one; they are rounded at the base with a mucronate apex. The male and female flowers are on different trees. The *male* are in an amentum, with the calyx divided into five small, ovate segments; the filaments, four or five in number, very short, and supporting large, brown, erect, quadrangular anthers. The *female* are placed on a common peduncle in alternate order, consisting of a calyx of three small squamous segments, and an ovate germen crowned with two or three styles, with reflected clubbed stigmas. The fruit is subovate, reddish, smooth, and gibbous towards the top on one side.

The turpentine is gathered chiefly in Chios, by making incisions in the bark of the trunk of the tree, in the month of July until the end of October. It is allowed to flow upon flat stones placed at the bottom of the tree, and after being condensed by the cold of the night, is scraped off the following morning before sunrise. It is then reliquified by the heat of the sun, and strained to free it from any extraneous matter; and in this state is imported into this country in casks. On account of its high price, Chian turpentine is often adulterated with common turpentine.

Qualities.— Chian turpentine has a fragrant odour, a moderately warm taste devoid of acrimony or bitterness; and a white or very pale greenish yellow colour: it has the consistence of thick honey, is clear, transparent, and tenacious; and in its other qualities, as well as its medicinal properties, resembles the other turpentines. See *Pinus*.

2. PISTACIA LENTISCUS.[1]

Officinal. MASTICHE, *Lond. Edin. Dub.* (var. *Chia*, L.). Mastic. Resinous exudation of Pistachia Lentiscus.

Syn. Mastic (*F.*), Mastix (*G. Swed. Dan.*), Mastik (*Dutch*), Mastice (*I.*), Almastiga, Almaciga (*S.*), Almacega da India (*Port.*), Roomie Mustiki (*Tam.*), Sakes (*Turk.*), Arah (*Arab.*), Kinneh (*Pers.*).

The lentisck, or mastich tree, is a shrub, a native of the Levant, particularly in the island of Chios. It flowers in May, and ripens its fruit in August.[2] It seldom exceeds twelve feet in height, and eight inches in thickness; is covered with a smooth brown bark;

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[1] Σχῖνος, Dioscoridis. *Der Mastixbaum* (G.), *Mastikboom* (Dutch.), *Mastixtræ* (Dan.), *Lentisque* (F.), *Lentisco* (I., S., Port.), *Xihudia* (Turk.).

[2] It appears to have been cultivated in Britain so early as 1664; but it never attains here any degree of perfection.

and towards the top sends off numerous branches: the leaves are abruptly pinnate; consisting of five or six opposite pairs of narrow, ovate leaflets, of a full lucid green colour on the upper, and a pale hue on the under side; they are sessile on the common footstalk, which has a narrow, foliaceous membrane or wing on each side, running from one pair of leaflets to the other. The male and female flowers are on distinct trees, and resemble those of the former species: the fruit is a drupe, containing an ovate, smooth nut, of a brownish colour when it is ripe.

Mastic is most abundantly obtained in the island of Chios. Transverse incisions are made in the trunks and branches of the lentisck trees, from the 15th to the 20th of July, from which the mastic slowly exudes, some dropping on the ground, which is made smooth and hard as a pavement for the purpose of receiving it; and some remaining fixed on the trees, and hardening so as to require, for its detachment, the aid of a sharp iron chisel. In both instances it concretes into a yellowish, semi-transparent substance. It is not gathered until August, when fresh incisions are made; and a second gathering takes place about the middle of September: no more incisions are made after this period of the year, but the gathering is continued, twice a week, until the 19th of November.

The low trailing lentiscks yield the finest mastic, and in the greatest quantity. Chios exports annually about 1508 cwts., part of which is brought to this country packed in chests.[1] That which is in the form of brittle grains, or in tears, is the best.

Qualities. — Mastic is almost inodorous, unless when rubbed or heated, when it exhales an agreeable fragrant odour. It is nearly insipid; and when chewed, at first crumbles, feeling gritty between the teeth, but by degrees becomes soft and white. When it is heated it melts. Ether dissolves it entirely; but in alcohol about one fifth remains undissolved, which has, when moist, the character of caoutchouc[2], but becomes brittle when dried, and therefore appears to be a peculiar vegetable principle. It appears to amount to nearly a fifth of the mastic.[3] In some respects this principle resembles the pure resins, being brittle, semi-transparent, fusible, insoluble in water, and soluble in ether; but it differs in being insoluble in alcohol. Mastic, when distilled with either water or alcohol, gives over very little with these liquids[4]; and this is perhaps a volatile oil; it contains 90 per cent. of *resin* soluble in

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[1] *Olivier's Travels* (translation), ii. 90. Olivier says, a soft mastic, having all the qualities of mastic, except in its consistence, which is that of turpentine, is procured by engrafting the lentisck on the Chian turpentine tree.

[2] *Crell's Annals*, 1794, ii. 185. *Thomson's Chemistry*, 4th edit. vol. v. p. 93.

[3] See Mr. Matthew's experiments, *Nicholson's Journ.* vol. x. 247.

[4] Hoffman (*Obs. Phys. Chim. Select.* p. 68.), however, states, that by rubbing the mastic in a mortar, with its weight of carbonate of potassa, and then distilling with alcohol, the liquid which comes over has both the smell and the taste of mastic.

alcohol, and 10 of an insoluble resin *masticine,* soluble in ether. The former is supposed to be an acid, the formula of which, according to Johnstone, is $C_{40}\ H_{31}\ O_4$; the latter is a resin, the formula of which is $C_{40}\ H_{31}\ O_2$.[1]

Medical properties and uses. — Mastic has generally been regarded as astringent and diuretic, and is ordered for the same diseases as turpentine; but its virtues, if it has any, are very trifling. The wood and leaves of the lentisck were used by the ancients in fluor albus and ulcerations of the uterus; and the Turkish and Armenian women use the mastic as a masticatory for cleaning the teeth, and giving an agreeable odour to the breath. It is employed to fill the cavities of carious teeth, for which purpose it is well adapted, from its property of softening in the mouth, and imparting little taste.

PIX ABIETINA. See *Pinus.*

PIX ARIDA. See *Pinus.*

PIX BURGUNDICA. See *Pinus.*

PIX LIQUIDA. See *Pinus.*

PIX NIGRA. See *Pinus.*

PLATINI BICHLORIDUM. *Lond. Appendix.* Bichloride of Platina.

This salt is prepared by dissolving platinum in nitro-hydrochloric acid and evaporating the solution to dryness, when it remains as a reddish-brown residue, very deliquescent, and soluble both in water and alcohol. Formula, $Pt\ Cl_2$. It forms crystallizable double salts with chlorides of ammonium, potassium, and sodium: the latter salt is very soluble. Both the bichloride of platinum and the platino-bichloride of sodium have occasionally been employed in medicine, especially on the Continent. In large doses, they cause all the effects of irritant poisons: in medicinal doses, their action appears to resemble very closely those of the persalts of mercury and gold. They have been used chiefly in secondary syphilis. The doses from $\frac{1}{8}$ gr. For the action of bichloride as a test, see *Pharmacopœia Appendix.*

PLATINUM. This metal is always found in the state of an alloy with other metals, especially with palladium and rhodium, from which it is separated by a rather complicated process. When

[1] Quoted by Dr. Pereira, *Elements of Mat. Med.*

pure, it is of a greyish-white colour; very malleable and ductile; very infusible, and cannot be fused except before the oxy-hydrogen flame and the agency of electricity; not altered by exposure in the atmosphere, nor attacked by the strongest acids; but is dissolved by a mixture of nitric and hydrochloric combined, in which the free chlorine is probably the active agent. It forms proto- and per-salts. Its sp. gr. is 21·5, one of the heaviest metals known; it is used in the preparation of the bichloride.

PLUMBI ACETAS. *Lond. Dub.* See *Preparations,* Part III.

PLUMBUM. Lead.[1]

Syn. Plomb (*F.*), Bley (*G.*), Lood (*Dutch*), Blye (*Dan.*); Bly (*Swed.*), Olow (*Polish*), Piombo (*I.*), Plomo (*S.*), Chumbo (*Port.*), Swinets (*Russ.*), Soorb (*Pers.*), Anuk (*Arab.*), Sisa (*H.*), Eeeum (*Tam.*), Sisaca (*San.*), Sheesh (*Duk.*), Temaetain (*Malay*), Ak-kil-lĕ-iook (*Esquimaux.*).

This is a metal of a bluish-grey colour, occurring in great abundance in most countries of both hemispheres of the globe, in primitive, transition, and floetz formations.[2] It is found,

A. in its metallic state:	
i. Sulphureted.	Sp. 1. *Galena.*
	Var. *a.* Common.
	b. Compact.
	2. *Blue lead ore.*
a. and combined with antimony.	3. *Antimonial sulphuret.*
B. united with oxygen:	
ii. Oxides.	1. *Yellow oxide.*
	2. *Native minium.*
iii. combined with carbonic acid.	1. *Carbonate of lead.*
	2. *Earthy lead ore.*
	Var. *a.* Indurated.
	b. Friable.
	3. *Black lead ore.*
b. —— with hydrochloric acid.	4. *Murio-carbonate of lead.*
c. —— with phosphoric acid.	5. *Phosphate of lead.*
	Var. *a.* Brown lead ore.
	b. Green lead ore.
	6. *Arsenio-phosphate.*
d. —— with chromic acid.	7. *Chromate of lead.*
e. —— with sulphuric acid.	8. *Sulphate of lead.*
f. —— with molybdenic acid.	9. *Molybdate of lead.*
g. —— with arsenic acid.	10. *Arseniate of lead.*

[1] The Harz mines yield annually 52 tons of lead. The Phœnicians exported lead from Cornwall and the Scilly Islands. — *Strabo.* l. iii. p. 175.

[2] According to Devergie, it is also a constituent of the bodies of men and all animals. *Journ. de Chim. Med.* t. iv. 2*d Series,* 1838.

Galena is the ore from which metallic lead is commonly procured. When brought up from the mine, the ore is broken in pieces, and the impurities, which are mostly iron pyrites, quartz, calcareous spar, and clay, are separated by picking and washing: it is then exposed to a strong heat in a common reverberatory furnace till the sulphur is all separated, after which the metal is brought into a state of fusion; and some lime being thrown in, the scoriæ, which are thus rendered solid on the surface of the melted metal, are raked to the side of the furnace, while the lead is run out into moulds through an aperture near the bottom; and in this state it is called *pig-lead.* It frequently contains silver, which is separated by oxidizing the lead into litharge, and freeing the silver from what remains by cupellation. Its equivalent is 103·56.

Qualities. — Pure metallic lead is of a light bluish-grey colour, and immediately after being melted or cut has a very considerable degree of lustre, which it quickly loses on exposure to the air, owing to the formation of carbonate of lead on its surface. It is nearly insipid; and emits, when rubbed, a peculiar unpleasant odour. It stains the fingers and paper of a bluish colour, and has a specific gravity of 11·38, which is somewhat diminished after it is well hammered.[1] It is the softest and least elastic of the solid metals; and although its ductility be trifling, yet it is malleable, and may be reduced into thin leaves and drawn into wire: it melts at a temperature of 612°[2], and at a greater heat is volatilized. Its susceptibility of oxidizement is very considerable: when it is exposed to the air at a high temperature, it is capable of uniting with oxygen, and forming three distinct oxides, which contains the following proportions of lead and oxygen:

	Lead.		Oxygen.
Grey or dinoxide contains	2 eqs.	+	1 eq.
Litharge, yellow or protoxide -	1 eq.	+	1 eq.
Red Lead - - - -	3 eqs.	+	4 eqs.
Puce or peroxide - - -	1 eq.	+	2 eqs.

The red lead appears to be a mixture of the protoxide and peroxide.

Medical properties and uses. — Lead has no action on the animal system in its pure metallic state; but when oxidized, or in combination with acids, it produces deleterious effects. Hence, metallic lead taken into the stomach may prove a poison, from its meeting with acids in the primæ viæ; and liquors which are apt to become in any degree acidulous[3], if kept in leaden cisterns, may, from the

[1] Muschenbroeck.
[2] Irvine, *Chemical Essays*, 35.
[3] A case of poisoning by cider, which had been kept for a few days in a leaden cistern during its preparation, is related in the *Ann. d'Hygienne Publique*, Jan. 1842.

same cause, be productive of much danger to those who drink them. I know an instance of the officers of an East Indiaman having been nearly poisoned from drinking simple soft water which was kept in a leaden cistern, and which, by the constant agitation of it, from the rolling of the ship, had oxidized the lead, and formed a carbonate of the oxide; and there have been instances, also, of plumbers being poisoned by the volatilized particles of lead, which are supposed in great part to form into a grey oxide. Distilled and rain-water, kept in leaden cisterns, form a carbonate of lead, and become poisonous; but hard water, or water containing certain saline matters, prevents this effect, by forming an insoluble compound with the lead, which protects it from the action of the air.[1] The mode in which lead acts on the animal system will be noticed under the head of *Carbonate of Lead.*

1. Carbonate of Lead.

Officinal. Plumbi Carbonas, *Edin. Dub.* Carbonate of Lead. Ceruse.[2]

Syn. Carbonate de Plomb (*F.*), Bleiweiss *G.*), Lootwit (*Dutch*), Blyhwit (*Swed.*), Bleghvidt (*Dan.*), Uglikisloi svinnots (*Russ.*), Carbonato di Piombo, Cerussa (*I.*), Blanco de Plomo, Albayale fino (*S.*), Asfeedāj (*Arab.*), Suffiah (*H.*), Vullay (*Tam.*).

This substance, which is known in commercial language by the name of *white lead,* is a carbonate of lead.[3] It is prepared in various ways, of which the following is one: — Sheets of lead, about two feet long, five inches broad, and a quarter of an inch thick, cast in a mould, and not afterwards flattened, are rolled up into loose coils, and placed in earthen pots, which are wider at the mouth than at the bottom. Each pot is capable of holding six pints of fluid; but into it as much vinegar only is poured as will rise so high as not to wet the lead, which rests on a ledge half-way down. In some manufactories, however, the pots are made to contain about a pint of vinegar only: and the lead, instead of being coiled up, is in form of a simple plate, which is laid over the mouth of the pot. The vinegar and lead being arranged, the pots are buried in fresh stable-litter, or new and spent tan mixed together, where they remain for about two months; during which time the vapours of the vinegar, elevated by the heat of the dung, oxidizes the surface of the lead, converting it into the yellow oxide;

It caused tremors, colic, costiveness, &c. The party recovered. Messrs. Chevallier and two other chemists examined the cider, and found that it contained malate of lead; although both Berzelius and Thomson say that this malate is insoluble.

[1] See *Christison on Poisons,* p. 384.

[2] Σανδυξ Dioscoridis.

[3] The various appellations, namely, *cerusse, magistery of lead, flake white,* and *subcarbonate of lead,* which are given to this substance, arise from the indeterminate ideas which prevailed as to its composition.

and, then, the vinegar forms with the oxide the diacetate which is decomposed by the carbonic acid gas evolved from the fermenting materials of the bed, and the carbonate is formed. The carbonate appears as a white scaly, brittle substance, on the surface of the lead, and is separated "by spreading the coils upon a perforated wooden floor covered with water, and drawing them to and fro by rakes, which detaches it, and causes it to sink through the water and the holes of the floor to the bottom of a vessel placed below."[1] In some places, this operation is performed by merely scraping off the carbonate with a knife. It is afterwards ground in mills fitted for the purpose. It was formerly ground dry, and the workmen suffered very severely from colic; but it is now ground in water, and the carbonate is afterwards dried in earthen pans placed in stoves, heated by means of flues.[2] The beauty of the carbonate depends on the purity of the lead.

It is now generally formed, in France and Sweden, by passing a stream of carbonic acid through a solution of the diacetate; and when the settling takes place, the precipitate, which is the carbonate, is dried in stoves in glazed earthen pots. It is sometimes adulterated with whiting, and sometimes with sulphate of baryta.

Qualities. — Carbonate of lead is inodorous, and nearly insipid; its crystal, when native, is a right-rhombic prism; but, artificially prepared, it is in the form of a very heavy white powder, insoluble in water, but soluble in dilute acids. It is decomposed by exposure to heat, and forms the yellow oxide. It dissolves in nitric acid with effervescence. When exposed upon charcoal to the action of the blowpipe, a button of metallic lead is produced. It consists of single equivalents of protoxide of lead and carbonic acid. Formula, $Pb\ O,\ CO_2$. Its adulteration with chalk may be discovered by pouring distilled vinegar on the suspected carbonate, and then adding oxalic acid, or oxalate of ammonia, to the solution. The formation of a precipitate proves the presence of chalk. Carbonate of lead loses no weight at 212°; 68 gr. dissolved in 150 minims of acetic acid, and diluted with f ℥j. of distilled water, is not wholly precipitated by 60 gr. of phosphate of lime.[3]

Medical properties and uses. — This preparation of lead is a very powerful astringent. It is used externally only, being sprinkled on inflamed and excoriated parts. Some writers, however, regard even its external employment dangerous: but we have ordered it a thousand times, without witnessing any bad effects to follow. It enters into the composition of some ointments.

It is from this preparation that many of the cases of poisoning

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[1] *Aikin's Dictionary.*

[2] This process was first used in Holland, and introduced into England in 1780. The purest metal is required: a trace of iron gives the carbonate a tawny hue.

[3] *Edinburgh Pharmacopœia.*

from the internal use of lead occur. Its effects as a poison were known to Galen. Painters, and those employed in grinding white lead, from the want of cleanliness and not washing their hands before eating, by which some of the white lead is introduced into the stomach with their food, are often poisoned by this carbonate; and it is the poison, when litharge is put into acid wines for the purpose of sweetening them, and when acetate of lead is put into hollands to deprive the spirit of the colour which it acquires when long kept in the wood. The symptoms which preparations of lead produce are obstinate costiveness, pain in the stomach, and vomiting: the pulse becomes small and hard; the respiration laborious; and tremors, ending in paralysis of the extremities, or death, ensue, when its operation is not counteracted by medicine. The gums display a leaden blue line. Does this arise from absorption and the decomposition of the lead in the system? Probably from a sulphuret of leads being formed by the action of the fluids of the mouth. Salivation sometimes supervenes, and the saliva has a blue tinge. The exhibition of cathartics, particularly castor oil, and sulphate of soda or of magnesia, combined with opium or henbane, plentiful dilution with mucilaginous liquids, the warm bath, and injecting mutton broth per anum, are the best antidotes: and if paralysis follow, recourse must be had to strychnia, administered in gradually augmented doses, until tetanic twitches display themselves. Galvanism will also be found useful.

When the presence of any salt of lead is suspected in a dry substance, it may be discovered by reducing it to a metallic state with the blowpipe upon charcoal; if in a liquid, by pouring into the suspected solution a solution of sulphureted hydrogen gas [1], when the lead is made obvious by a dark brown precipitate, which is insoluble in most acids, the lead being formed into an insoluble sulphuret. This sulphuret should next be washed and digested in nitric acid, diluted with twice its weight of water. This nitrate being brought to dryness by heat, to expel any excess of nitric acid, should be dissolved, and iodide of potassium dropped into the solution; if it be nitrate of lead, a yellow iodide of lead will be formed.

Officinal preparations. — *Unguentum Plumbi Carbonatis*, E. D.

2. SEMI-VITRIFIED OXIDE OF LEAD.

Officinal. PLUMBI OXYDUM, *Lond. Dub.* LITHARGYRUM, *Edin.* Litharge. Oxide of Lead.

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[1] To prepare this solution, put into a phial sulphuret of iron, pour over it dilute sulphuric acid, and receive the gas which is produced, through a bent tube connected with the phial, into a flask filled with distilled water.

Syn. Litharge (*F.*), Bleiglätte (*G.*), Loot glans, Zilverschium (*Dutch*), Silwer-glitt (*Swed.*), Sölver glöd (*Dan.*), Glem (*Russ.*), Piombo semi-vitreo, Litargiro (*I.*), Almastago, Litargireo (*S.*), Marudar Singhie (*Tam.*), Moordar singh (*Pers. Duk. Hind.*).

This oxide is prepared by the simple action of heat and air upon lead. It is generally obtained during the calcination of lead, when separating the silver with which this metal is often combined. The lead is placed in a wind furnace, on a large cupel, or hollow dish made of ashes, and kept at a red heat with the blast of a large pair of bellows directed upon its surface; a scaly, yellowish white, glistening oxide is soon produced, and successively formed by raking it off and exposing new surfaces till the whole of the lead is thus converted into litharge.[1] Any variation of the steps of the process varies the colour of the oxide: some kinds of it, from having a silvery gloss, are denominated litharge of silver; and others, from the colour being a reddish-yellow, litharge of gold.

Qualities.—Litharge is inodorous and insipid: it is in flakes with a vitreous lustre; dissolves in many of the acids; and is a protoxide, containing 103·56 parts of lead and 8 of oxygen, or 1 equivalent of each element. When pure it dissolves in acetic and diluted nitric acids without effervescence.

Medical properties and uses.—Litharge, like the other preparations of lead, is an astringent. The ancients were acquainted with it.[2] It is never given internally; and is used only for pharmaceutical purposes. Litharge is sometimes added to wines which are sour. It may be detected either by passing sulphureted hydrogen gas through the suspected wine, or evaporating the wine to the consistence of syrup, and then reducing the lead with charcoal, in a crucible. In all cases of poisoning by salts or oxides of lead the best antidote is a solution of magnesiæ sulphas, with the addition of some sulphuric acid; which, uniting with the deleterious salt of lead, forms an inert sulphate of lead, which is carried out of the bowels by the sulphate of magnesia.

Officinal preparations.—*Emplastrum Plumbi vel Lithargyri*, L. E. D.

3. RED OXIDE OF LEAD.[3]

Officinal. OXYDUM PLUMBI RUBRUM, *Edin.* Red Oxide of Lead.

Syn. Minium (*F.*), Mönnige, Mennig, Rothesblei oxyd (*G.*), Mounie (*Dut.*), Monja (*Swed.*), Minio (*I.*), Minio, Vermillon (*S.*), Isrenj (*Arab.*), Sindur (*H.*), Segāpoo Sindooerum (*Tam.*). Sindura (*San.*), Temamera (*Malay*).

This preparation is lead in a high state of oxidizement. It is prepared in a reverbatory furnace, vaulted like a baker's oven, and

[1] The Harz mines yield annually 70 tons of litharge.

[2] It was known to Dioscorides, Ætius, and others, but we have no records of its employment as a medicine until 1541, when it was prescribed by Paracelsus.

[3] Ψιμμυθιον Dioscoridis.

having two internal walls, rising from the floor, but not reaching to the roof. The coals are placed between these internal walls and the wall of the furnace, by which means the flame is drawn over the top, and reflected from the roof down upon the surface of a quantity of lead placed on the floor. The metal soon melts, and is altogether converted into a yellow oxide, or *massicot*, by successively raking off the pellicles which form on its surface: this is then ground in a mill, and washed, to separate any metallic lead, by which it becomes of a uniform yellow colour, and, after being replaced in the furnace, is exposed to the flame whilst it is constantly stirred for about forty-eight hours. It is thus gradually converted into red oxide of lead.[1] By this process, 20 cwts. of lead produce on an average 22 cwts. of red lead, notwithstanding a portion is necessarily volatilized. To save the previous calcination, litharge is sometimes employed.

Qualities.—Red oxide of lead, the *minium* of commerce, is inodorous and insipid, in the form of a very heavy, scaly powder, and of an intense red or scarlet colour, verging into orange. When heated to redness it gives out oxygen gas, and runs into a dark-brown, hard glass. Its composition appears to vary a little, but is supposed to be a mixture of proto- and peroxide of lead, and to have the formula $Pb_3\,O_4$, or $2\,Pb\,O + Pb\,O_2$. By the action of nitric acid it is converted into the puce or peroxide of lead ($Pb\,O_2$), and the protoxide, which unites with the acid to form a nitrate of the metal.

Medical properties and uses. — Red lead may be applied to the same uses as litharge, but is now rarely used in pharmacy. Its chief use is in the arts, as a pigment.

POLYGALA.[2] *Spec. Plant. Willd.* iii. 871.

Cl. 17. *Ord.* 3. Diadelphia Octandria. *Nat. ord.* Polygalaceæ.
G. 1313. *Calyx* five-leaved, with two of the leaflets wing-shaped, and coloured. *Legume* obcordate, two-celled.
*** *Beardless; herbaceous, with a simple stem.*
Species 67. P. *Senega.* Seneka root. *Med. Bot. 3d edit.* 452. *t.* 162 *Amœn. Acad.* iii. 124. *Pursh.* iii. p. 464. *Hayne*, xiii. 21.
Officinal. SENEGA, *Lond. Edin. Dub.* Seneka, snake-root. Root of Polygala Senega.

Syn. Polygale de Virginie (*F.*), Senegawurzel (*G.*), Poligala Virginiana (*I.*), Rattlesnake root (*Tennant.*), Senega (*Swed. Dan. Russ.*).

This plant is a perennial native of North America, flowering in June.[3] The root is woody, branched, contorted, gibbous, and covered with yellowish, ash-coloured bark; it sends up several

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[1] *Watson's Chemical Essays*, iii. 338. *Aikin's Dictionary.*
[2] Πολυς, *much*, and γαλα, *milk.*
[3] It was first cultivated in England by Mr. F. Miller, in 1759.

stems a foot in height, erect, slender, round, smooth, and of a dark reddish colour below and green above. The leaves are petiolate, alternate, lanceolate, acute, somewhat undulate on short petioles: the flowers are in loose, terminal spikes, small white, and papilionaceous, with the calyx divided into three narrow persistent segments: the fruit is an inversely-cordate capsule, containing several small seeds.

The root is brought from Virginia in bales, each containing from two to four hundred weight.

Qualities. — Seneka-snake-root is nearly inodorous: the taste is at first sweetish and nauseous; but after being chewed for less than a minute becomes bitter, pungent, and hot, producing a very peculiar tingling sensation in the fauces. These qualities reside in the bark; which, on the dried root, is white within, and covered with a brownish-grey, corrugated, transversely cracked cuticle: the central part is white, but woody and inert: alcohol extracts the whole of its active matter, which is precipitated from the tincture by the addition of water; and the ethereal tincture deposits a pellicle of resin, but no extractive. From six ounces of the root Peschier separated 100 grains of a peculiar principle, which he has named *Poligalina,* united with a new acid, which he has denominated the *Poligalinic;* and this salt he supposes is the active principle of seneka root.[1] Gehlin separated also a peculiar principle of a brown colour, hard, brittle, and translucent, having the taste of senega in an imminent degree; insoluble in water, strong alcohol, and ether, but soluble in proof spirit. He named it *Senegin.* When pure it is white, tasteless at first, afterwards acrid, and feeling astringent in the gullet, and forms salts with metallic oxides: it is very acrid; and six grains have been stated to have killed a dog in three hours, causing symptoms of irritant poisoning (Christison). According to Quevenne, its formula is $C_{22}\ H_{18}\ O_{11}$ (?). Hot water extracts the virtues of Seneka-root partially only, but in a sufficient degree to exert its influence on the animal system.

Medical properties and uses. — This root is a stimulating expectorant and diuretic; and in large doses, emetic and cathartic: it increases absorption, and consequently augments the natural excretions, particularly that of urine; and frequently occasions a copious ptyalism. It was introduced to the notice of physicians by Dr. Tennant, who having discovered that it was the antidote employed by the Senagaro Indians against the bite of the rattlesnake, and reasoning from the effects of the poison, and of the remedy in removing these, was induced to try it in pneumonic affections, and found it useful. On account of its stimulant properties, however, it can be employed in these complaints only

[1] *Pharmacopœia Batavia, &c. editione de Joanne Frid. Neimann.* Lipsiæ, 1824.

after the resolution of the inflammation by bleeding and evacuations. It proves more directly useful in humoral asthma, chronic catarrh, and some kinds of dropsy; and has been found very efficacious in rheumatic and scrofulous ophthalmia, even after pus had appeared in the anterior chamber.[1] The extract of it combined with carbonate of ammonia has been found by Dr. Brandreath, of Liverpool, to be efficacious in some cases of lethargy: and in America the decoction given in divided doses, at short intervals, till it vomit or purge, has been employed with seeming success in croup[2]: it has also been used as a stimulant gargle in the same disease.

It may be administered either in the form of powder or decoction, combined with aromatics, opium, or camphor, which check its nauseating qualities. Madeira wine, where it can be ordered, may be used to cover the taste of the powder. The dose in substance is from grs. x. to ℈ ij. repeated every three or four hours.

Cartheuser recommended the root of this plant in incipient cataract. Dr. Schmalze, of Dresden, found it very useful in all inflammatory affections of the eye which are followed by a morbid secretion from that organ, such as rheumatic ophthalmia; in catarrhal ophthalmia, erysipelas of the eye, and in different species of iritis, with the exception of those arising from syphilis. It is contra-indicated in scrofulous affections, at least those accompanied with morbid exudations of the cornea. It is very salutary in hypopyon, at the moment when the disease is passing from the inflammatory state to that of exudation. Senega has been very highly extolled as an emænagogue, by Drs. Hartshorne and Chapman, of America, who think it one of the most active, certain, and valuable remedies of this class. Dr. Chapman prefers the form of decoction for administration; and, at the expected menstrual period, gives it in doses as great as the stomach will allow.

Officinal preparations. — *Decoctum Senegæ*, L. *Infusum Senegæ*, E. *Infusum Polygalæ*, D.

POLYGONUM. *Spec. Plant. Willd.* ii. 440.

Cl. 8. *Ord.* 3. Octandria Trigynia. *Nat. ord.* Polygonaceæ.
G. 3. *Corolla* five-parted, calycine. *Seed* one, angular.
** *Bistorts, with a single spike.*
Species 3. P. *Bistorta.*[3] Great Bistort or Snakeweed. *Med. Bot. 3d edit.* 668. *t.* 232. *Smith, Flora Brit.* 427. *Eng. Bot. t.* 509. *Hayne,* v. 13.

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[1] *Medical Repository*, vol. iv. (New Series), p. 56.
[2] *London Medical Review and Magazine*, iii, 426.
[3] Bistorta, *quasi* bis torta, twice twisted. — *Alston, Mat. Med.* vol. i. 399.

Syn. Bistorte (*F.*), Natter knöterig (*G.*), Nater-Wortel (*Dutch*), Bistorta (*I. S. Port.*), Slangeurt (*Dan.*), Ormrot (*Swed.*), Sertechnaja trava (*Russ.*).

This plant grows in many parts of Europe, Siberia, and Japan, and is indigenous to Great Britain. It is found generally in moist meadows, flowering in June.[1] The root is perennial, woody, and tortuous, or twice bent: the stem rises nearly two feet in height, is foliaceous, jointed, swelling at the joints, solid, smooth, and bending a little near the top: the leaves are ovate, those next the root cordato-lanceolate: the whole are entire, waved at the edge, veined, of a fine green colour on the upper surface, and glaucous below; the lower ones are on long, winged footstalks, those of the stem almost sessile, amplexicaule, and sheathing. The flowers are small, of a pale-rose colour, collected into a close, oblong, terminal spike, an inch and a half to two inches long; the single flowers standing on short white flower-stalks, which rise in pairs from membranous, withering bracts. The corolla is divided into five obtuse segments, with nectareous glands at the base: the filaments are longer than the corolla, tapering, and supporting purple anthers; and the germen is triangular, of a red colour, crowned with three long styles, with small round stigmas. The seeds are three-sided, of a dark-brown colour, and shining.

Qualities.—The dried root is inodorous, and has a very austere taste. Water extracts its virtues. The decoction strikes a deep black with persulphate of iron, and precipitates gelatin. It contains a large proportion of *tannic acid,* much *starch,* some *oxalate of lime,* and *colouring matter.*

Medical properties and uses.—The root of bistort is astringent and tonic. It is employed in hæmorrhages, obstinate fluxes, leucorrhœa, and all diseases in which simple astringents are indicated. It has also been given in intermittents, combined with gentian, or acorus calamus. Externally, a strong decoction of it is a useful lotion for spongy gums and ill-conditioned ulcers. But it is almost discarded from modern practice.[2]

The dose of the powdered root is from grs. xx. to ʒ j., twice or thrice a day.

POTASSÆ BICARBONAS, *Lond.* Bicarbonate of Potash. See Part III.

POTASSÆ BICHROMAS, *Dub.* Bichromate of Potash.

This salt has been introduced into the Dublin Pharmacopœia,

[1] It is, however, not confined to low situations, being found on the Carpathian Alps, vegetating under pinus *magnus*, at an elevation of 4476 feet. Vide *Wahlenbergh's Flora Carpatorum.*

[2] In Iceland the recent root of bistort is eaten raw, or converted into bread. It may, therefore, be reasonably inquired, what effect can it have as a medicine, when prescribed in the small doses usually ordered?

for the purpose of preparing Valerianic acid, by the oxidation of amylic alcohol. It is procured by the action of sulphuric acid on the neutral chromate, which latter salt is obtained from the chrome iron ore ($Fe\ O,\ Cr_2\ O_3$). The bichromate, by slow evaporation, crystallizes in large red tabular crystals, melting when heated, soluble in about 10 parts of water, the solution having an acid reaction. Formula $K\ O,\ 2\ Cr\ O_3$. It is largely employed in the arts. It is a powerful irritant and caustic, and has occasionally been used as an external application. When heated with organic matters it acts as an oxidizing agent.

POTASSÆ BITARTRAS, *Lond. Edin. Dub.* Bitartrate of Potassa, Cream of Tartar.

Syn. Tartrate acidule de Potasse, Crême de Tartre (*F.*), Weinsteinrahm (*G.*), Wynsteenroom (*Dutch*), Cremore di tartaro; Ossitartrato ossidulo di Potassa (*I.*), Dvuvinnokisloe kali (*Russ.*).

This is the saline crust deposited on the sides of casks of wine, purified. In its impure or crude state it is called *argol.* To purify it, argol is first reduced to powder, then dissolved in boiling water in tubs, and the clear fluid poured off from the sediment. The clear solution is then allowed to remain at rest, when it deposits brown crystals of tartrate of potassa, which are boiled in copper vessels with the mother liquor, and clarified by throwing in whites of eggs, and some finely sifted wood-ashes. An effervescence immediately takes place, and a red scum is thrown up, which is carefully skimmed off with a perforated skimmer; and the throwing in of the wood-ashes, with the subsequent skimming, are repeated for fourteen or fifteen times; after which the liquor is taken from the fire, and allowed to remain at rest for three days. On the fourth day, a dirty white saline crust is removed from the surface, and two thirds of the liquor ladled out. The crystals which now form are white and clean, and require no further preparation than drying on a wicker frame. In some places, instead of wood-ashes, a portion of pure clay is diffused through the boiling solution. The exposure of the crystals on cloths to the air and light whitens them very considerably.[1]

Qualities.—Bitartrate of potassa is inodorous; and when allowed to dissolve in the mouth, which it does very slowly, and feeling gritty under the teeth, has a harsh, acid taste. Its crystals are small and irregular six-sided prisms, generally run together into little masses, which are of a white colour, semi-transparent, brittle, and easily reduced to powder. Its specific gravity is 1·953. It requires for its solution 40 parts of boiling

[1] Schauh says, it may be purified by simply boiling it with powdered recent charcoal, and very white crystals obtained. — *Annales de Chimie*, xlix. 64.

water, and 120 of cold water. The addition of boracic acid increases its solubility without altering the constitution of the salt.[1] The salt remains unaltered in the air; but its solution decomposes spontaneously by keeping: a mucous matter is deposited, and there remains a solution of carbonate of potassa, coloured with a little oil.[2] The solution reddens litmus, and is precipitated by lime water and the acetates of lead. This salt consists of 1 eq. of tartaric acid ($C_8\ H_4\ O_{10}$) + 1 eq. of potassa + 1 eq. of water; or, it is a tartrate of potassa and water (tartaric acid being bibasic). Its formula is $K\ O,\ H\ O,\ \bar{T}$.

Medical properties and uses. — This salt is purgative, diuretic, and refrigerant. As a purgative it is frequently employed, on account of its taste being less unpleasant than the generality of saline cathartics: but it is apt, when long used, to produce emaciation, chiefly owing to its powerful action on the intestinal exhalants. This property is taken advantage of with great effect in the treatment of dropsy, particularly ascites, in which the bitartrate of potassa has been found extremely efficacious. It occasions a considerable discharge of serous fluid into the bowels, which is thrown off in the form of watery stools, in which case the discharge by urine is not augmented. The serous fluid in the cavity of the abdomen is, however, thus rapidly carried off; and the chances of a return of the disease are supposed to be fewer than when diuretics are employed. I am of opinion, however, that in cases complicated with hepatic obstructions the effects of this remedy are very uncertain. It forms a very useful hydragogue purgative in dropsies connected with albuminuria. It may be advantageously united with squill; and, owing to the exhaustion it occasions, its use should be followed by preparations of iron, and other tonics. When in small doses and much diluted, it acts as a powerful diuretic, and renders the urine alkaline. As a refrigerant, bitartrate of potassa dissolved in water, and the solution sweetened with sugar, is a pleasant beverage in febrile diseases, when its purgative quality is not likely to prove injurious. As a purgative and hydragogue the dose is from ʒiv. to ʒvj., in the form of electuary; as a diuretic and refrigerant ℈j. to ℈ij. or ʒj.

POTASSÆ CARBONAS, *Lond. Edin.* LIXIVUS CINIS, *Dub.* Impure Carbonate of Potassa. Potashes. Pearl-ashes.

Syn. Carbonate alkalinule de Potasse (*F.*), Koloensuares Kali, Potasche (*G.*), Potasch (*Dutch*), Pottaske (*Dan.*), Potaska (*Swed.*), Potash (*Russ.*), Potassa del Commercio (*I.*), Cenizas, claveladas (*S.*), Marra Ooppoo (*Tam.*), Hindee loonoo (*Cing.*), Jhār ke némuck (*Duk.*), Kshāra lavana (*Sans.*).

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[1] This admixture is termed by the French *Crème de Tartre soluble.*

[2] This decomposition was first described by Berthollet, in 1782. *Mem. Par.* *Thomson's Chemistry*, 4th edit. vol. iii. p. 93.

This substance consists chiefly of carbonate of potassa, mixed with some other salts. It is known in commerce by the name of potash; and is brought to us principally from the Baltic and America.[1] The manipulation of the process by which it is prepared differs in different countries; but the general features of it are every where the same. The dried stems and branches of plants are set fire to, and reduced to ashes; which are lixiviated by pouring over them, in proper vessels, hot or cold water, so as to dissolve the alkaline matter they contain. The impregnated solution, drawn off from the ashes, is then boiled to dryness in iron boilers, and leaves behind a solid saline mass, coloured brown by a small portion of vegetable inflammable matter, and which generally becomes moist. This is the *potash* of commerce. After the colouring matter is destroyed, and a portion of the water dissipated by calcination in a reverberatory furnace, it assumes a spongy texture, with a bluish or greenish colour, and is then denominated *pearl-ashes.*

Those vegetables only which grow at a distance from salt water are employed to obtain this product. Herbaceous plants yield the largest proportion, and shrubs more than trees. Kirwan remarks, that although fumitory produces more of this salt than any other plant, and next to it wormwood, yet that 1000 parts of the ashes of wormwood yield more potassa than the same quantity of the ashes of fumitory, in the proportions of 748 and 360. It has been said that it is obtained in great abundance from the herbaceous part of the potato, cut down just as the fruit is beginning to form: 40,000 lbs. of the dried stems, it has been stated, will yield 2200 lbs. of impure potassa; but the trials in this country have not confirmed these statements.[2] It is generally supposed, that at least the greater part of the potassa is contained ready-formed in the vegetables; but this is somewhat doubtful, and perhaps in living plants the base only of potassa exists as an element, and is oxidized so as to form the alkali during the combustion. (?) Such is the conjecture of Dr. Murray[3]; and the same may take place during the spontaneous decomposition of plants where much water is present, for potassa can be obtained by the evaporation of dunghill water.[4]

The pearl-ash of commerce is still a very compound mass, containing, besides the carbonate of potassa, sand, with which it is often adulterated to a great extent, sulphate of potassa, chloride of potassium, oxide of iron, and oxide of manganese; to the last of which, according to Scheele, it owes its bluish or greenish colour.

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[1] Brunswick makes about 80 cwts of potassa yearly.

[2] *Phil. Mag.* vol. i. p. 340.

[3] *Murray's Chemistry*, 2d edit. ii. 193.

[4] See Birch's Experiments, *Phil. Trans.* for 1780, p. 845.

Different parcels of pearl-ash must undoubtedly contain different quantities of potassa; and hence no accurate standard of the proportion of the ingredients can be fixed. The following table, drawn up by Vauquelin, shows the comparative value of samples from different countries examined by him. The quantity of each was 1152 parts.[1]

From the following table it appears that the American ashes are more productive of potassa, but contain more of other salts than the Russian, or any other except that of Treves.

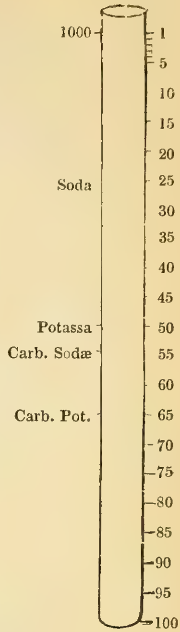
Kinds of Potassa.	Real Potassa.	Sulphate of Potassa.	Chloride of Potassium.	Insoluble Residue.	Carbonic Acid and Water.
Russian potash	772	65	5	56	254
American do. -	857	154	20	2	119
Pearl-ash - -	754	80	4	6	308
Potash of Treves	720	165	44	24	199
Dantzic potash	603	152	14	79	304
Potash of Vosges	444	148	510	34	304

The proportion of real alkali in any quantity of pearl-ash may be ascertained in the following manner:—Pulverize 100 grains of the pearl-ash, and digest in successive portions of hot water as long as anything is dissolved; filter to separate all the insoluble matter; and add sulphuric acid, according to Dr. Faraday's *alkalimeter*, in successive small quantities, until litmus paper shows that the whole of the alkali is neutralized. The quantity of the diluted acid contained in each division of the tube which has been used indicates one grain of potassa.[2] The alkalimeter is a tube $9\frac{1}{2}$ inches long, and $\frac{3}{4}$ of an inch in diameter. It is graduated by pouring into it 1000 grains of water, and marking the point to which it reaches with a file or diamond; dividing the space occupied by the water into 100 equal parts; and writing the words in the marginal cut opposite to the numbers, 23·44—

[1] *Annales de Chimie*, xl. 284.

[2] The value of the diluted acid must be previously ascertained, by adding to 100 grains of it chloride of barium as long as any precipitate falls. This forms sulphate of baryta, which, when washed, and dried at a low red heat, contains 33·3 per cent. of sulphuric acid; by which the proportion of real acid in the diluted acid may be known. — *Aikin's Dictionary*, i. 263.

48·96—54·63 and 65. To use the tube, prepare a diluted acid of 1·127 sp. gr. at 60°, by mixing one measure of concentrated sulphuric with eight measures of distilled water: pour as much into the tube as will reach the mark 48·96: this quantity should neutralize 100 grains of potassa: so that, by proceeding as above described, we readily ascertain the quantity of real potassa present in the specimen of pearl-ashes.



The pearl-ash of commerce is not sufficiently pure for medicinal use; and therefore it is used only for pharmaceutical purposes.

Carbonate of potassa is also procured by calcining bisulphate of potassa with charcoal in a reverberatory furnace: a sulphuret is formed, which is decomposed by roasting: the sulphur is dissipated, the potassium is oxidized, and the potassa combined with carbonic acid.

In the present London Pharmacopœia carbonate of potassa, sufficiently pure for medicinal purposes, is placed in the Materia Medica.

Officinal preparations.—*Potassæ Carbonas purum*, E. D. *Potassæ Carbonas e Lixivo Cinere*, D. *Liquor Potassæ Carbonatis*, L. D.

POTASSÆ CHLORAS, *Lond. Dub.* Chlorate of Potassa.

This salt is made by passing a stream of chlorine through a concentrated solution of carbonate of potassa until the alkali is completely neutralized. In this case the carbonate of potassa is decomposed, and in the first instance chloride of potassium, hypochlorite of potassa, and bicarbonate of potassa are formed; but as the chlorine continues to be supplied the bicarbonate is decomposed, and more of the two other salts is formed, whilst carbonic acid is liberated, which reacting on the hypochlorite, a portion of its acid is set free: but as the solution is more strongly charged with the hypochlorite, the chlorine abstracts the potassium of the potassa, and forms the chloride, whilst the freed oxygen uniting with the hypochlorite converts it into the chlorate. The solution is then boiled for a few minutes to expel any excess of chlorine, and allowed to cool. In this state it contains both chloride of potassium and chlorate of potassa; but, as the latter is much less soluble than the former, the chlorate crystallizes, whilst the chloride still remains in solution. The crystals, thus procured, require to be washed in cold water and recrystallized. Mr. Graham recommends the carbonate of potassa to be mixed with an equivalent portion of dry hydrate of lime, before exposing it to the action of the chlorine.

In this process the products are *carbonate of lime, chlorate of potassa,* and *chloride of potassium.*[1]

Qualities.—Chlorate of potassa is an inodorous white salt of a pearly lustre: its taste is cool and austere: it crystallizes in four and six sided scales, or rhomboidal plates, which require sixteen parts of water at 60°, and two and a half at 212°, for their solution. At a temperature of 400° to 500° it undergoes the igneous fusion; and at 666° it is decomposed, and pure oxygen gas is disengaged. It contains no water of crystallization. Its formula is KO, ClO_5.

Medical properties and uses.—Chlorate of potassa is a powerful stimulant and diuretic; and it appears to undergo no change in passing to the kidneys. It gives a fine arterial colour to the blood[2] (?) It is little employed; but it may be advantageously prescribed to rouse the energies of the system in typhus, and other depressing affections. It was at one time employed in the treatment of syphilis, but it has deservedly fallen into disrepute in that disease. It has been found useful as a diuretic. The dose of the salt is from grs. vj. to ℈j. in solution, three times a day.

POTASSÆ NITRAS, *Lond. Edin. Dub.* Nitrate of Potassa. Nitre.

Syn. Nitre, Nitrate de Potasse (*F.*), Salpetersaures kali (*G.*), Salpeter (*Dutch*), Salpeter (*Dan.*), Saltpeter (*Swed.*), Saletra (*Pol.*), Nitro, Salnitro (*I.*), Salitre nitro (*S.*), Nitro (*Port.*), Selitra, Azotnokisloe kali (*Russ.*), Pottle Ooppoo (*Tam.*), Shora (*Pers.*), Sandaiva (*Malay*), Ubkir (*Arab.*), Wedie looneo (*Cing.*), Shora (*H.*), Yavac Shora (*San.*).

This salt is well known in commerce under the name of saltpetre or nitre. It may be regarded both as a natural and artificial production: being found effloresced on the surface of the soil in Hungary[3] and some parts of Europe[4], South America, Africa[5], and very abundantly in Tirhût in India[6], whence this country is chiefly supplied; while in some countries, as in Germany and France, it is artificially produced. In India the most productive nitre soils contain much carbonate of lime. Nitre is artificially

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[1] *Proceedings of the Chemical Society*, No. 1.

[2] *Stevens on the Blood*, p. 155.

[3] *Beudant's Travels in Hungary.*

[4] A great repository of native nitre in Europe is the Pulo of Molfelta, in the province of Puglia, in the kingdom of Naples. It is a deep cavity formed by the falling in of several caverns. The Abbé Fortis first drew public attention to this place, at which time it was lined with a crust of nitre an inch thick, which on being scraped off was successively renewed in a few days.

[5] Near the city of Tlemsan, in the kingdom of Algiers, six ounces of nitre are extracted, by simple lixiviation, from one quintal of the common mould.—*Shaw's Travels*, p. 228. In the alluvial districts near the Tigris, the efflorescence of nitre is so great in December, that many tracts in the lower Tigris become almost snow white. *Ainsworth's Researches in Assyria*, &c., 8vo. 1838, p. 119.

[6] The presidency of Calcutta exports annually upwards of 8000 tons of nitre.

prepared by the same means as nature employs, the artificial composts being imitations only of the natural soils where it is most abundantly formed; by giving, therefore, an account of the former mode both will be better understood. Glauber first suggested the formation of what are termed nitre-beds. In France they consist of a compost of putrefying animal and vegetable matters, such as blood, offal, excrementitious matters, and decaying leaves, with street sweepings, old mortar, chalk, and other calcareous matters; which are mixed in casual proportions, and lightly spread in long beds, covered with roofs to protect them from the weather. These are turned up occasionally, frequently moistened with putrid water or urine; and at the end of two years, or less, are supposed to be fit to yield the nitre by lixiviation. The theory of this process, which is not yet completely elucidated, was not at all understood till the experiments of Thouvenal, and the discovery of the composition of nitric acid by Mr. Cavendish, removed much of the obscurity in which it was involved: the following is the explanation. The spontaneous decomposition of the animal and vegetable matter evolves nitrogen, oxygen, hydrogen, and carbon, which reuniting by the operation of new affinities, new compounds are formed; and among these nitric acid, by the union of the nitrogen from the animal substances with the oxygen from the vegetable matter. The acid thus formed is attracted partly by the calcareous earth of the beds, and partly by a portion of potassa, either contained in them ready formed, or, as some have supposed, formed during the process. The presence of animal matter, although it aids the formation of nitre, yet is not essential; for Dr. J. Davy found a rich impregnation of nitre in a nitre-cave near Mensoora, in the district of Doombera, in Ceylon, in a decomposing rock consisting of calcspar, felspar, quartz, mica, and talc, in a humid state exposed to the air, and perfectly free from any animal matter.[1] The presence of a certain degree of heat and humidity, of atmospheric air, of lime and some alkaline mineral, is absolutely necessary; for besides fixing the nitric acid when formed, the affinities which lime exerts to oxygen and nitrogen favour very much their combination, and consequently the formation of the acid.

The compost, when ready to be lixiviated, is first mixed with wood-ashes, or with pulverized impure potassa, to decompose the nitrate of lime. It is then put into a cask furnished with a cock at the bottom, and an inner, false, perforated bottom: a quantity of river water is now poured over it, and after some hours the cock is turned, and the liquor drained off: but it is used instead of water for a second portion of earth; and this is successively repeated, till it is supposed to be sufficiently impregnated with the soluble matter of the compost. The lixivium, which contains

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[1] *Davy's Account of the Interior of Ceylon*, 4to. p. 32. Lond. 1821.

chiefly nitrate of potassa, and the chlorides of potassium and of sodium, is now boiled and clarified with bullocks' blood or a solution of glue; and the boiling being continued, the chlorides as they form are withdrawn by perforated ladles, till the liquor is so concentrated that a few drops poured on cold iron immediately crystallize. It is then, when nearly cold, poured into separate crystallizing dishes, in which after some days the salt is found deposited in a confused mass of opaque, dirty-white, imperfect crystals, which, after being broken to pieces and drained, are known under the name of rough or crude nitre, or crude saltpetre.

Nitre is brought from Bengal in an impure state, but cyrstallized, put up in bags, each containing two bazar maunds, or 164 lbs. weight.[1] The crystallized state of this impure nitre arises from the lixivium of the soil having been slowly evaporated in shaded, shallow pits. To purify crude nitre, it is repeatedly washed with cold water, which dissolves the deliquescent salts: and then is boiled with half its weight of water, until a pellicle forms on the surface; after which the solution is poured into leaden coolers, and stirred till it is quite cold, by which means the salt is deposited in acicular crystals.[2] Different processes are employed in different places.[3]

Qualities.—Pure nitrate of potassa is inodorous; and has a bitterish, sharp taste, occasioning a sensation of cold both in the mouth and stomach. It is generally in white, pellucid, brittle, six-sided prisms, terminated by two-sided or diedral summits, the specific gravity of which is 1·933. These crystals are soluble in seven parts of water at 60°, producing cold during their solution; but boiling water takes up its own weight of them. They are perfectly insoluble in strong alcohol. They are permanent in the air, melt when exposed to a moderate heat, and when cast into moulds, form balls, which are called *Sal Prunelle.* They contain no water of crystallization, but water is generally entangled in them. In a strong heat nitre undergoes the igneous fusion; oxygen gas is disengaged at first, and afterwards nitrogen gas:

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[1] Each Bengal ship of 800 tons generally brings home in a period of war about 5000 bags of nitre.

[2] Nitre was unknown to the ancients: and Beckmann thinks that it was not discovered till the 13th century. The term *sal petrosum* is first mentioned in the work of Albertus Magnus "*De Mirabilibus Mundi,*" in a prescription of Marcus Græcus for making the Greek fire; but it is probable, as Beckmann conjectures, that this salt was known long before this period in India, where he believes gunpowder also was invented, and brought by the Saracens from Africa to Europe.—*History of Inventions*, vol. iv.

[3] Nitre has been found in many plants: the horseradish, the nettle, the sunflower, Pariera *brava*, and Geum *urbanum.* M. Chevalier found it in Chenopodium *olidum*, Vauquelin in Solanum *nigrum*, Dr. John in the ice-plant, and Chevreul in woad.

and in a continued intense heat, the acid is completely expelled and decomposed, leaving behind pure potassa. Nitre when mixed with inflammable substances detonates in a strong heat; and if charcoal be used, a pure carbonate of potassa remains behind. Nitre consists of single equivalents of potassa and nitric acid. Formula KO, NO_5.

Nitrate of potassa sometimes contains chloride of sodium, sulphate of soda, and sulphate of potassa. The chloride is discovered by nitrate of silver, throwing down a precipitate, every 100 grains of which denote $42\frac{1}{2}$ of chloride of sodium. The sulphates are detected by salts of baryta.

Medical properties and uses.—Nitrate of potassa is refrigerant, diuretic, and diaphoretic; and, when externally applied in solution, it is cooling and detergent. If taken in repeated small doses, it increases the secretion of urine, in which, and in the alvine dejections, the salt may be detected, unchanged, by chemical tests. It is efficaciously given in active hæmorrhages, particularly hæmoptysis, in which it may be administered in doses of a drachm, without exciting griping or any action in the bowels. It is also given in febrile affections, on account of its refrigerant or sedative influence; and has been lately extolled as a powerful remedy in acute rheumatism by Dr. Basham, who gives it in very large doses. It is also useful in herpetic eruptions. Although diuretic, yet it is of little use in dropsies, and is contra-indicated in typhus and hectic fever: in the latter of which, as Dr. Percival has justly observed, it lowers the pulse at first, but afterwards raises it higher than before. A small portion of it, allowed to dissolve slowly in the mouth, often removes incipient inflammatory sore-throat; and hence its utility in gargles in that complaint.

It is most advantageously given dissolved in mucilaginous fluids, in moderate doses not exceeding grs. xv. frequently repeated: but the dose may be carried to ʒ ij. with safety. In larger doses it excites nausea, a lively sensation of cold at the epigastric region, and sometimes colic; and in very large doses, from ʒ iv. to ℥ j. for instance, which have sometimes been taken by mistake for sulphate of soda, it causes vomiting, hypercatharsis, bloody stools, convulsions, and sometimes death. Opium and aromatics are the best antidotes.

Officinal preparations.—*Potassæ Nitras purum*, D. *Trochisci Nitratis Potassæ*, E.

POTASSÆ SULPHAS, *Lond.* Sulphate of Potash. See Part III.

POTASSÆ TARTRAS, *Lond.* Tartrate of Potash. See Part III.

POTASSII FERROCYANIDUM, *Lond. Edin. Dub.* Ferrocyanide of Potassium.

Syn. Ferrocyanure de Potassium, Prussiate jaune de Potasse, Prussiate de Potasse ferrugineux (*F.*), Kaliumeisencyanur, Cyaneisenkalium (*G.*), Idroferrocyanato di Perossido di ferro (*I.*), Geletsistosinerooisttoi kali (*Russ.*).

This salt is prepared by calcining at a red heat a mixture of hoofs, horns, or blood, and impure potassa, in an iron vessel: a black carbonaceous pasty mass is procured, which is assiduously stirred until fœtid vapours cease to be given off. It is then dissolved, filtered, and concentrated. The soluble parts are dissolved in water; the ferrocyanide crystallizes, and is obtained pure by repeated solution and crystallization.

Qualities. — Ferrocyanide of potassium is procured in large, translucent, four-sided tabular crystals, usually truncated, octohedrous, of a fine yellow colour, permanent in the air, of a sp. gr. 1·332. It is inodorous; has a sweetish, slightly bitter saline taste; water at 60° dissolves about one third, at 212° its own weight of the salt: it is insoluble in alcohol. When heated at a temperature of 212°, it loses its water of crystallization, 12·82 per cent., and becomes white; but recovers it in a moist temperature. At a red heat, air being excluded, cyanide of potassium, oxide of iron, and carbon are formed. When strongly heated, and air admitted, a cyanate of potassa is formed. The formula of this salt is 2 K Cy + Fe Cy + 3 H O. Probably the elements are not grouped, as represented above, as the salt does not possess the properties of ordinary double cyanides. It is incompatible with proto and sesqui salts of iron; salts of copper; and salts of lead.

Medical properties and uses. — Ferrocyanide of potassium exerts little or no influence on man[1], although it has been said to operate as a sedative and an astringent. It is rarely employed in this country: but in America it is prescribed to reduce the pulse and allay pain. Dr. Smart[2] prescribed it successfully in a case of chronic bronchitis in a child; it lowered the pulse, relieved the dyspnœa, and diminished the frequency and hardness of the cough. Dr. Smart has also found it useful in hooping cough. Its astringent influence is said to be manifested in checking the colliquative sweats, in chronic bronchitis and phthisis, and in lessening the discharge of leucorrhœa. I have never prescribed it.

This salt, according to Dr. Smart, may be administered n solution (ʒ ij. to f ℥ j. of water) in doses of ♏ xxx. to xl. to an adult, every four or five hours. When over dosed it is said to cause vertigo, coldness, numbness, and a sensation of sinking; but this is doubtful.

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[1] D'Arcet swallowed a solution containing lb. ss. of this salt without any injurious effects. *Merat and De Lens, Dict. Mat. Med.* ii. 532.

[2] *Amer. Journ. of Med. Science,* vol. xv. p. 362.

POTASSII IODIDUM, *Lond.* Iodide of Potassium. See Part III.

POTASSII SULPHURETUM, *Lond.* Sulphuret of Potassium. See Part III.

POTASSII ET HYDRARGYRI IODO-CYANIDUM, *Lond.* Appendix. Iodocyanide of Potassium and Mercury.

This salt has been introduced into the Appendix of the London Pharmacopœia, for the purpose of detecting the presence of any foreign acid in the officinal hydrocyanic acid. It is prepared by adding a concentrated solution of bicyanide of mercury to one of iodide of potassium. After a short time the double salt separates in the form of pearly-white scales, which are but little soluble in cold water. Their mode of action, as a test, will be found in the Pharmacopœia Appendix. Formula $K\,I + Hy\,Cy_2$.

POTENTILLA. *Spec. Plant. Willd.* ii. 1112.

Cl. 12. *Ord.* 5. Icosandria Polygynia. *Nat. ord.* Rosaceæ.
G. 1001. *Calyx* three-cleft. *Petals* four. *Seeds* roundish, naked, affixed to a small juiceless receptacle.
Species 1. P. *Tormentilla.*[1] Common Tormentil, or Septfoil (T. *officinalis*). *Smith, Flora Brit.* 552. *Eng. Bot. t.* 863. *Med. Bot. 2d edit.* 503. *t.* 181. *Hayne,* ii. 48.
Officinal. TORMENTILLA, *Lond. Edin.* Tormentil rhizome. (Root, E.)

Syn. Tormentil (*F.*), Törmentilwurzel, Fingerkraut (*G.*), Meerwortel (*Dutch*), Blodrot (*Swed.*), Kurzeziele (*Pol.*), Tormentilla (*I. Port.*), Tormentila (*S.*), Uzik, Zavjaznik (*Russ.*).

This is a very common, indigenous, perennial plant, growing in dry pastures and on heaths; flowering in June and July. The root is woody; the stems are erect, branched, diffuse or procumbent, round and leafy. The leaves are nearly sessile, ternate, lanceolate, serrated, and hairy, accompanied by deeply incised stipules. The flowers are on long, capillary, opposite, solitary, one-flowered peduncles; the calyx consists of ovate, hairy, alternately larger and smaller segments, the latter of which are exterior; the petals have short claws, are obcordate, and of a golden-yellow colour: the seeds are few and wrinkled.

Qualities. — The root has a very slightly aromatic odour, and an austere styptic taste. It is cylindrical and knotty: externally blackish, and internally reddish. To boiling water it yields its active matter, which appears to be chiefly tannic acid, as the infusion is copiously precipitated by solution of isinglass, and strikes a deep black with persulphate of iron. Except galls and catechu,

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[1] Πενταφυλλον Dioscoridis.

it contains more tannic acid than any other vegetable. According to Meissner, it contains a trace of *volatile oil,* 17·4 of *tannic acid,* 18.05 *colouring matter,* 2·57 *modified colouring matter,* 0·42 *resin,* 0·51 *cerin,* 0·20 *myricin,* 4·32 *gum,* 28·20 *extractive,* 15·0 *lignin,* and 6·45 *water.*[1]

Medical properties and uses. — Potentil root is a powerful astringent. It has been employed with success in intermittents, but more efficaciously in diarrhœas; particularly those attendant on phthisis, as it produces its astringent effects without increasing the general excitement. As a local remedy it may be advantageously used in the form of gargle and lotion in ulcerations of the tongue and mouth, against spongy gums, and as an application to fœtid, ill-conditioned sores; but it is seldom used. It may be given in substance, or in the form of decoction. The dose of the powdered root is from ℨss. to ʒj.

Officinal preparations.—*Decoctum Tormentillæ,* L.

PRUNUS. *Spec. Plant. Willd.* ii. 984.

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. ord.* Amygdalaceæ.
G. 982. *Calyx* five-parted, inferior. *Petals* five. *Nut of the drupe* with prominent sutures.
Species 10. P. *Lauro-Cerasus.* Cherry Laurel. *Blackw. t.* 512. *Med. Bot. 3d edit.* 3. *p.* 513. *t.* 186. *Hayne,* 140.
Species 29. P. *domestica.*[2] Common Plum Tree. *Med. Bot. 3d edit.* 520. *t.* 187.

1. PRUNUS LAURO-CERASUS.

Officinal. LAURO-CERASUS, *Edin. Dub.* Cherry Laurel, the leaves.

Syn. Laurier Cerise (*F.*), Kirsch-lorbeerbaum (*G.*) Laurierkers (*Dutch*), Lagerbär, Kurobarstrad (*Swed.*), Lorber-kirsebærstræe (*Dan.*), Laurovischnevoe derevzo (*Russ.*), Lauro-rizio (*I.*), Lauro real (*S.*), Loiro-cerejo (*Port.*).

The cherry laurel (Cerasus *lauro-cerasus*), which has been removed from the genus Prunus to Cerasus, is a native of Trebizond; but it has been naturalized to this climate, and attains a considerable size. It is an evergreen, shedding the leaves early in summer, at which time they are pushed off by the new shoots. The leaves are supported on short sulcated petioles: they are coriaceous, from four to seven inches in length, about two broad, acuminate, sparsely dentated, smooth, shining on the upper disc, pale green and dull on the under; inodorous unless bruised, when they exhale a strong smell of bitter almonds. The plant is well characterised by a glandular pore in the axilla of the second lateral vein on the under side of the leaf.

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[1] *Gmelin Handb. d. Chim.* ii. 1269.
[2] Κυκκυμηλεα Dioscoridis, Barkuk (*Arab.*) Muei Xu (*Chin.*).

Qualities. — The recent leaves have a slightly astringent, intensely bitter taste, which they lose by drying. They yield both odour and taste to water in distillation; and an oil, resembling that of bitter almonds, and containing hydrocyanic acid, is procured in small quantity, the greater part of it remaining in combination with the water.[1] Neither the volatile oil nor the hydrocyanic acid pre-exist in these leaves, but probably *Amygdaline* is present.

Medical properties and uses. — The recent leaves are sedative, and a powerful poison: they are employed as an application to cancerous sores; bruised, and made into a poultice with crumb of bread. Dr. Cheston made an infusion with four ounces of the leaves in two pounds of boiling water, to which he added four ounces of honey: this mixture he spread on linen, and applied to cancerous ulcers. For the properties and uses of the distilled water, see Part III.

Officinal preparation. — *Aqua Lauro-Cerasi,* E. D.

2. PRUNUS DOMESTICA.

Officinal. PRUNUM, *Lond.* PRUNA, *Edin. Dub.* Prunes.

Syn. Prunes (*F.*), Pflaumen (*G.*) Priumen (*Dutch*), Pruno domestico, or Prugna (*I.*), Ciruelas pasas (*S.*), Sliwnik (*Russ.*), Erik (*Turk.*).

The tree which yields this fruit is a native of Asia and Greece, although it is now completely naturalised to Europe, and to our climate, growing wild in coppices, and flowering in April and May. It rises about fifteen feet in height, with a moderately spreading head. The leaves are pale green, standing on short petioles, which have two glands near the base of the leaf: they are serrated, smooth, and, when young, convoluted and pubescent underneath: the flowers are large, on short solitary peduncles, with an erect calyx, and obovate white petals: the fruit is a superior, berried, oval drupe, swelling a little more on one side, and three grooved; of a bluish violet colour on the outside, internally consisting of a yellow, fleshy, sweet pulp; and containing a smooth, almond-shaped nut.[2]

The dried fruit, which only is officinal, is imported from the Continent in chests; and that which is brought from Bordeaux is regarded as the best. The recent fruit, when perfectly ripe, is pleasant to the palate, and sufficiently wholesome; but when eaten

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[1] Procter found hydrocyanic acid in the bark of Prunus *virginiana.*

[2] Martyn, in his edition of Miller's Gardener's Dictionary, enumerates sixty varieties of the plum. The French prunes are the same as those which were formerly brought from Damascus.

too freely it occasions flatulence, griping, and diarrhœa, more readily than any other fruit.

Qualities.— Prunes are nearly inodorous, but have an agreeable, sweet, subacid taste. They contain about 11·51 per cent. of *sugar*, 4·85 of *gum*, 0·93 *albumen*, 1·10 *gallic acid*, 1·21 *lignin*, a trace of *lime*, and 80·24 of *water*.[1]

Medical properties and uses.—Dried plums or prunes are gently laxative, and form a pleasant addition to purgative electuaries and decoctions. Simply boiled, they may be beneficially given to children who are habitually costive; and in fevers.

Prunes are contained in *Confectio Sennæ*, L. E. D.

PTEROCARPUS.[2] *Spec. Plant. Willd.* iii. 904.

Cl. 17. *Ord.* 4. Diadelphia Decandria. *Nat. ord.* Leguminosæ.

G. 1318. *Calyx* five-toothed. *Legume* falcated, leafy, varicose, surrounded with a wing, not gaping. *Seeds* solitary.

Sp. 6. P. *Santalinus.* Red-saunders tree. *Med. Bot. 3d edit.* 430. *t.* 156. *Willdenow, Spec. Plant.* iii. 906.

Sp. nova, P. *Erinaceus. Encycl. Method. Lam. Illust. Gen.* tab. 602. fig. 4. Nees von Essen. 337. African Kino tree.

Sp. —. P. *Marsupium.* Indian Kino tree. *Roxburg Flor. Indic.* iii. 234.

1. PTEROCARPUS SANTALINUS.

Officinal. PTEROCARPUS, *Lond. Edin.* Red-saunders wood.

Syn. Santal rouge (*F.*), Rothes Sandalholz (*G.*), Root Zandelhout (*Dutch*), Sandalo Roso (*I.*), Sandolo rubio (*S.*), Ract Chandan (*H.*), Segapoo Shandanum (*Tam.*), Sundul Ashmer (*Arab.*), Sundul Soorkh (*Pers.*), Ruct Handoon (*Cing.*), Ruckta Chunduna (*Beng.*), Racta Chandana (*San.*), Hoam pe mo (*Chin.*).

This tree is a native of the mountains of India, particularly the rocky parts in the Onore district[3], and of Ceylon. It is a lofty tree, with alternate branches, and bark resembling that of the common alder. The leaves are petiolate and ternate, each simple leaf being ovate, blunt, entire, retuse, veined, smooth on the upper surface, and hoary beneath; the flowers are in axillary spikes, without bracts: the calyx is brown: the corolla papilionaceous, consisting of an erect, obcordate *vexillum*, turned back at the edges, denticulate, curled and waved, and of a yellow colour, with red veins; yellow, spreading, denticulate *wings*, waved at the edges; and an oblong *keel* a little inflated and curled at the tip; the filaments are yellow, and support globular, white anthers: the germen is oblong, compressed, hirsute, with a curved style,

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[1] *Berard and Reine-Claude.*

[2] From πτερον, a *wing*, and καρπος, *fruit*.

[3] When transplanted to low situations and a richer soil, the tree degenerates, and is, in all respects, less esteemed. — *Forbes's Oriental Mem.* 4to. vol. i. p. 808.

and an obtuse stigma: the pod is pedicelled, compressed, smooth, keeled along the lower edge, and contains one round compressed seed.

This tree, which yields the true officinal red-saunders wood, was first detected by Kœnig in India. The wood is brought home in billets, which are very heavy, and sink in water.

Qualities. — Red-saunders wood has an aromatic odour, and is nearly insipid. It is extremely hard, of a fine grain, and a bright garnet-red colour, which deepens on exposure to the air. It can be pulverized, but with difficulty; when heated, it exudes a red resinous-like matter resembling what is termed dragon's blood. It yields its colouring matter, which appears to be of a resinous nature, to ether and alcohol, but not to water.[1] The alcoholic tincture is red, but becomes yellow when largely diluted with water. Volatile oil of lavender also extracts its colouring matter; yet it is scarcely affected by oil of turpentine, which acquires a pale yellow tinge only, even when assisted by heat. Neumann first noticed this fact[2]; and it has been suggested that the camphor contained in the oil of lavender may give it the above property; but camphor in oil of turpentine has no more effect than the simple oil. I find that by shaking oil of turpentine, which has been digested over red-saunders, with a little alcohol, the slight tinge of colour it received is instantly taken up by the spirit, and the oil settles as a colourless substratum. According to Pelletier, the colouring matter is a peculiar principle, insoluble in water, but soluble in alcohol, ether, acetic acid, the alkalies, and some volatile oil; he named it *santalin:* it exists, in combination with extractive gallic acid, and lignin, in the red-saunders wood. The formula of *santalin* is $C_{16}\ H_8\ O_3$.[3]

Red saunders has no medicinal properties, and is used only as a colouring matter.[4]

It is contained in *Tinctura Lavandula composita,* L. E.

2. PTEROCARPUS ERINACEUS ET P. MARSUPIUM.

Officinal. KINO, *Lond. Edin. Dub.* (*Indicum*). The juice flowing from the incised bark of Pterocarpus Marsupium, and hardened in the sun, *L.* Concrete exudation of Pterocarpus Erinaceus, and of other undetermined genera and species, *E. D.*

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[1] Yet Willdenow, who received the description of the tree and its wood from Kœnig, says, "attritu humido pulchre rubrum tingens." The yielding no colouring matter to water affords an easy mode of distinguishing red saunders from Brazil wood, which was first pointed out by Dr. Lewis. — *Thomson's Chem.* v. 208.

[2] *Neumann's Chem.* 337.

[3] *Journ. de Phys.* lxxix. 268.

[4] The dragon's blood, the product of the Pterocarpus *Draco,* is now rejected from the Pharmacopœia. The tree grows in great abundance on the island of Porto Santo, near Madeira.

Syn. Gomme de Kino (*F.*), Kinoharz (*G.*), Chino (*I.*), Toomble hoän (*Tam.*), Dhak ke gend (*Beng.*).

The plant which yields the best kino is an African tree; and from a specimen sent home by Mungo Park, which we examined, in the possession of Sir Joseph Banks, it is a Pterocarpus, and that species which is described under the specific name *Erinaceœ* in the Encyclopédie Méthodique. It is a native of Senegal; and is distinguished from the other species of the genus by the fruit, having a short, straight, lateral point. The leaves are deciduous, pinnated; composed of obtuse, oval leaflets, larger at the base, petiolate, entire, thin, and smooth above; pubescent, and of a reddish hue beneath, where they are marked with fine, parallel, alternate, oblique ribs or nerves, a little arched. The flowers are papilionaceous, on peduncles. The calyx is bell-shaped, truncated, slightly toothed, and pubescent. The fruit is a compressed, orbicular pod, bulging on both sides in the middle, where it is bristled with stiff white hairs. It contains one seed only. In procuring the kino from this tree, incisions are said to be made in the trunk and branches, from which the juice flows; but it soon coagulates, becomes of a deep garnet colour and brittle, and is the real African kino, which is now seldom or never found in the market. Some of the kino found in the shops is brought from Botany Bay, and is the production of the Eucalyptus *resinifera*, the brown gum tree of that country.[1] It belongs to the natural order Myrtaceæ; but the kino which it yields differs in several of its qualities from the kino described by Dr. Fothergill, who introduced this remedy into practice.[2] Another sort is occasionally found in commerce, and is said to come from Jamaica, and to be the extract of the *Coccoloba uvifera*, or sea-side grape[3]; while Dr. Murray says, "he has been informed that it is the extract of the wood of mahogany."[4] The kino now chiefly found in commerce is said to come from India; and, until very recently, the tree which yielded the East Indian kino was undetermined; but from the researches of Drs. Pereira, Royle, Wight, and Kennedy, it has been found to be the produce

[1] This plant belongs to the first order of the twelfth class of the Linnæan system. It is a lofty tree, exceeding an English oak in size; and bearing yellowish flowers in umbellated clusters. The calyx is hemispherical, perfectly entire in the margin, and afterwards becomes the capsule; on the top, just within the margin, stands a pointed calyptra, of the same colour as the calyx, and as long. This calyptra, which is the essential mark of the genus, is analogous to the corolla in other plants, but neither splits nor divides; on removing it, a great number of red stamens appear, standing in a conical mass, very resinous, aromatic, and bearing small red anthers. In the centre is a simple style terminated by a blunt stigma, and rising from a transversely cut trilocular germen. The quantity of juice obtained from incisions made into the wood of the trunk amounts, sometimes, to sixty gallons from one tree. — See *White's Voyage*, 231.

[2] *Medical Obs. and Inquiries by a Society of Physicians in London*, i. 238. 243.

[3] *Edinburgh New Dispensatory*, 5th edit. 292. *United States Dispensatory.*

[4] *System of Mat. Med. and Pharmacy*, ii. 304.

of *Pterocarpus Marsupium*, a tree which has the following characters: "Trunk erect, very high, scarcely ever found straight. Bark with the outer coat brown, spongy, falling off in flakes; inwardly red, fibrous, and astringent. Branches spreading, horizontal, numerous, extending far. Leaves sub-bifarious, alternate, pinnate, with an old one, eight or nine inches long. Leaflets 5, 6 or 7, alternate, elliptic, emarginate, firm; above shining and deep green; below less so, from three to five inches long, and two or three broad: petioles round, smooth, waved from leaflet to leaflet; five or six inches long: stipules none. Panicles terminal, very large: ramifications bifarious, like the leaves. Peduncles and pedicels round, a little downy. Bractes small, caducous, solitary; below each division and subdivision of the panicle. Flowers very numerous, white, with a small tinge of yellow. Vexillum with a long slender claw, very broad; sides reflexed, waved, curled, veined: Keel 2-petalled, adhering slightly for a little way near the middle, waved &c. as the vexillum. Filaments ten, united in one body near the base, but soon splitting into two bodies of five each. Anthers globose, 2-lobed. Ovary oblong, pedicelled, hairy, generally 2-celled; cells transverse, and 1-seeded. Style ascending. Legume three-fourths orbicular, the upper remainder, which extends from the pedicels to the remains of the style, straight; the whole surrounded with a waved, veined, downy membranous wing; swelled, rugose, and woody, in the centre, where the seed is lodged, not opening generally, though sometimes 2-celled, and solitary, kidney-shaped.[1]

Dr. Kennedy[2] states that "The juice is extracted when the tree is in blossom, by making longitudinal incisions in the bark round the trunk of the tree, so as to let the gum ooze down into a receiver formed of a broad leaf, so placed and fixed in the bark as to prevent the gum from falling on the ground. From the leaf it is made to run into a receptacle placed under the leaf to receive the gum. When this receptacle is filled, it is removed, the gum is dried in the sun until it crumbles, and then filled into wooden boxes for exportation."

East Indian kino is imported in chests containing from one to two cwt., and on the inside of the lid of each chest is a paper, inscribed with the name of John Brown, the month and year of its exportation; and stating that it is the produce of Amboyna.[3]

Qualities. — 1. *Kino* which was given to me as a specimen of true *African kino* is inodorous, and insipid when first taken into

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[1] *Lindley, Flora Medica.*

[2] *Manual of Mat. Med.*, by Dr. Royle.

[3] What is called Gambir in Borneo is an extract of the Nauclea *Gambir*, a tree belonging to the natural order Cinchonaceæ, made by boiling the leaves and young shoots in iron pans, and inspissating the decoction. It is a yellowish brown colour, bitter, in small cakes; and is, in fact, catechu.

the mouth; but after some time it imparts a slight degree of roughness, with a scarcely perceptible sweetness, to the palate; feels gritty between the teeth when chewed, and does not colour the saliva. It is in very small, irregularly shaped, shining, deep ruby-brown coloured fragments, which are intermixed with small twigs, and minute bits of wood. It is pulverulent, affording a dark chocolate or reddish brown powder. Water at 60° dissolves the larger moiety of it, and gives a brick red rather turbid infusion, which does not become clear after standing twenty-four hours. Alcohol dissolves nearly two-thirds of it, the tincture having a very deep brown colour: what remains undissolved is nearly colourless. Ether takes up about one-third; and the tincture, which is of a beautiful claret-colour, when evaporated on the surface of water, leaves a pellicle of brittle brown resin; while a sweetish red-coloured extractive matter remains dissolved in the water. True African kino is now scarcely ever met with.

2. *Botany Bay kino* is in large, irregular dark-brown masses, or in fragments covered with a reddish brown powder: it is inodorous; tastes bitterish, and more austere than the African; it is equally brittle, breaking with a glassy fracture, and affording a brown-coloured powder; but it is not uniform in appearance, some of the fragments being of a lighter hue. Heat swells it; and a white smoke, with a dense flame, rises before the clearing is completed. Water at 60° dissolves more than of the former variety, and the infusion is brown and transparent. Boiling water forms with it a deep cherry-red solution, which deposits a brick-red sediment on cooling. Alcohol dissolves rather more than two-thirds of its weight, but the tincture is not so deep-coloured as that of the former variety. Ether takes up one-twentieth; a pale brownish-straw-colour only is imparted to it; and, when evaporated on water, the resinous pellicle is scarcely perceptible, and very little extractive is deposited. This kino is the produce of *Eucalyptus Resinifera.*

3. The *kino* said to have been brought from Jamaica, but of which none is now to be procured, is in bitterness and roughness nearly equal to the last variety, but these qualities are accompanied with a slight degree of acidity. It is in brittle masses, sometimes retaining the shape of the vessel in which it was dried, of an almost black colour, having a shining, resinous fracture, in which appears small air bubbles. The powder is of a reddish-brown colour. With alcohol and ether it affords results very similar to those of the first variety. Water dissolves a greater portion of it than of the other two kinds, and forms an infusion intermediate in colour and transparency; approaching in colour to the first, and in clearness to the second variety. It is the produce of *Coccoloba uvifera,* or Sea-side Grape.

4. *East India* or *Amboyna kino* is inodorous, very rough, and

slightly bitter when first taken into the mouth; but it afterwards impresses a degree of sweetness on the palate. It is in small, uniform, deep brown, shining, brittle fragments, which appear like portions of a dried extract broken down, being perfectly uniform in their appearance. It is easily pulverized, affording a powder of a lighter brown colour than the fragments. Water dissolves two-thirds of it, forming a deep brown clear solution: whilst the portion that remains undissolved is long suspended, if mixed with a fresh portion of water.[1] Alcohol dissolves the greater part of this variety, forming a deep claret-coloured tincture, which is not rendered turbid on the addition of water. Ether takes up a portion of it, and forms a yellowish red tincture, which, when evaporated on water, leaves no resinous pellicle. It is the produce of *Pterocarpus Marsupium*.

All the varieties, according to Vauquelin, contain tannic acid, but no gallic acid. They dissolve in solutions of pure potassa and of ammonia, and no precipitation takes place on the addition of water. Some chemical change, however, is effected; and the astringent property of the kino is completely destroyed, — a fact which ought to be kept in remembrance in prescribing this remedy. A principle called Catechin or Catechuic acid, has been found in kino. Its formula, $C_{15}\ H_6\ O_6$. It strikes green with the salts of iron.

The following tables show the result of some experiments with several chemical re-agents on the watery infusions of these three varieties of kino.[2] They point out the distinctive features of the four varieties I have enumerated: but they have no pretensions towards advancing the knowledge of the chemical properties of kino.

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[1] In India, an aqueous solution of kino is employed for dyeing the colour termed *Nankeen* on cotton and other clothes. — *Virey, Bullet. de Pharm.* tom. iv. p. 364.

[2] The specimens subjected to these experiments, I have reason to think, were perfectly genuine. The African kino was brought home twenty years before I received it.

TABLE I. Precipitates formed in the Aqueous Solution of Kino, by Gelatine, and Solutions of some Metallic Salts.

Variety of Kino.	*Solution of Isinglass.*	*Solution of Persulphate of Iron.*	*Solution of Nitrate of Silver.*	*Solution of Bichloride of Mercury.*	*Solution of Acetate of Lead.*
1st.	copious, slowly formed, of a brick red colour.	copious, quickly formed, of a dirty olive black.	copious, slowly formed, of a deep reddish brown.	not very copious, slowly formed, reddish.	copious, flocculent, quickly formed, brown.
2d.	copious, almost instantly formed, of a pink colour.	very slowly formed, of a deep brownish black.	copious, quickly formed, of an olive black.	copious, quickly formed, yellowish pink.	copious, flocculent, quickly formed, lilac.
3d.	scanty, slowly formed, of a pinkish colour.	copious, quickly formed, of a blue black.	copious, quickly formed, reddish brown.	scarcely altered.	copious, flocculent, quickly formed, brownish lilac.
4th.	the same as No. 1.	copious, and dirty olive black.	copious, and quickly formed, reddish brown.	quickly formed, reddish.	the same as No. 1.

TABLE II. Precipitates formed by Solution of Potassa and Acids.

Variety of Kino.	*Potassa.*	*Sulphuric Acid.*	*Nitric Acid.*	*Hydrochloric Acid.*
1st.	none, but renders it clear, and of a deep brown colour.	copious, pale brown.	scanty, slowly formed, reddish yellow.	scanty, slowly formed, yellowish brown.
2d.	flocculent, purplish.	copious, deeper brown.	copious, quickly formed, yellowish brown.	scanty, more quickly formed, pale red brown.
3d.	flocculent, brownish purple.	very copious, very deep brown.	copious, brown.	scanty, quickly formed, a beautiful red.
4th.	the same as No. 1.	copious, pale brown.	copious, quickly formed, brown.	quickly formed, yellowish brown.

From these experiments there appears to be considerable difference between three of the four varieties of kino known in commerce, but the first and the fourth appear to be nearly the same. The most remarkable differences are, the small portion of resin which that from Botany Bay and Amboyna contains; the blue colour of the precipitate of the Jamaica variety by the persulphate of iron; and the effect of the solution of potassa in rendering that from Africa transparent, while it precipitates the second and the third varieties. The predominant principles, in all the varieties, are tannic acid and extractive matter; and the portion of resin, in the first and third varieties, enables ether to take up their colouring matter, and some extractive, while the second variety is scarcely affected by it. Dr. Duncan[1] and Vauquelin[2] observed, that although heat increases the solvent power of water over kino, yet that a substance insoluble either in water or in alcohol always remains. Vauquelin also found that the solutions form a precipitate with tartarized antimony and the salts of iron. The Botany Bay kino, when made into tincture with proof spirit, after being kept for some months, deposits so large a portion of vegetable jelly that the contents of bottles containing it become almost solid; on which account rectified spirit is now ordered to be employed, as it does not take up the gelatinous part of the kino.

The best menstruum is diluted alcohol.

Medical properties and uses. — Kino is a powerful astringent. Like catechu, it is employed in obstinate chronic diarrhœas, lientery, uterine and intestinal hæmorrhages, and fluor albus; but, as it is supposed to be less certain in its qualities than catechu, it is less used. It has also been used for the cure of intermittents; and it is said to increase the power of cinchona. Externally, it has been employed as a styptic, and to give tone to and diminish the ichorous discharge of flabby ill-conditioned ulcers. The alkalies, as already stated, destroy its astringent qualities.

It may be exhibited internally in substance,—*i. e.* in powder, or in the form of watery solution, or of tincture. The dose in substance is from grs. x. to ʒ ss.; and that of the solution ℥j ss. In ordering the solution or the tincture, it is necessary to recollect that solutions of isinglass, sulphate of iron, nitrate of silver, bichloride of mercury, acetete of lead, potassio-tartrate of antimony, the alkalies, and the strong acids, are incompatible in prescriptions with kino.

Officinal preparations. — *Pulvis Kino comp.*, L. *Tinctura Kino*, L. E.

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[1] *Nicholson's Journal*, vi. 234.

[2] *Annales de Chimie*, xlvi. 321. Vauquelin states generally, that the salts of iron precipitate kino green; but Dr. Duncan justly observes, that by the red sulphate it is precipitated black: the sulphate only precipitates it green.

PULEGIUM ET PULEGII OLEUM. Vide *Mentha Pulegium.*

PUNICA. *Spec. Plant. Willd.* ii. 981.

Cl. 12. *Ord.* 1. Icosandria Monogynia. *Nat. ord.* Myrtaceæ.
G. 930. *Calyx* five-cleft, superior. *Petals* five. *Pome* many-celled, many-seeded.
Sp. 1. P. *Granatum.*[1] Pomegranate tree. *Med. Bot. 3d edit.* 531. *t.* 190. *Hayne*, x. 35.
Officinal. GRANATUM, *Lond.* GRANATI RADIX, *Edin. Dub.* Pomegranate. Rind of fruit and bark of root.

Syn. Le Grenadier (*F.*), Granatass felschale (*G.*), Granaat-boom (*Dutch*), Granattrad (*Swed.*), Drzewo Granatow (*Pol.*) Pomo Granato (*I.*), Romã (*Port.*), Granadas (*S.*), Granatnik (*Russ.*), Rānā (*Arab.*), Anàr (*H.*), Darim (*San.*), Daelfima (*Sang.*), Magilam palam (*Tam.*), Dalema (*Malay*), Delunghedie (*Cing.*), Daleemb (*Mah.*).

The pomegranate tree is a native of the south of Europe, Asia, and Barbary: but in the West Indies where it was introduced from Europe, the fruit is larger and better flavoured than in its native climates.[2] In its proper soil, which is a cretaceous one, it rises twenty feet in height, sending out branches from the whole length of the stem, some of which bear thorns. The leaves are opposite, about three inches long, half an inch broad in the middle, pointed at each end, entire, and of a light, lucid-green colour: the flowers, which are terminal, and sessile, are three or four together: the calyx is thick, fleshy, of a fine red colour, and divided into five-pointed segments: the petals are wrinkled, and of a scarlet colour; the fruit, according to Gærtner[3], is a pulpy many-seeded berry, the size of an orange, crowned with the calyx, which is sharply toothed, and globular. It is covered with a thick coriaceous rind.

The red succulent pulp, which is not officinal, is pleasantly acid[4], resembling that of the orange: it is cooling, and useful for quenching thirst, and gently aperient; and was made into wine by the ancients.

Qualities. — The *flowers*, which are named *Balaustines*, are inodorous, taste bitterish and astringent, and give a reddish colour to the saliva. The *bark of the fruit*, and of the root, have the same sensible qualities. The former, when dry, is externally brownish, but internally yellowish; it is about a line in thickness,

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[1] 'Ροα Dioscoridis, *Han Xe lieu* (Chin.).

[2] It stands our winters, and even bears fruit, which, however, has not the proper flavour.

[3] *De Fructibus*, i. 183. *t.* 38. *f.* 1.

[4] Russell says there are three varieties of this fruit in Syria: one sweet, another very acid, and a third partaking of the qualities of both blended. — *Nat. Hist. of Aleppo*, ii. 85.

is hard and brittle. Water extracts the virtues of both; and the solutions strike a deep bluish-black with sulphates and other salts of iron. According to Reuss, 216 parts yield 60 of *tannin*, 74 of *mucus*, 2 of *resin*, 22 of *oxidized tannin*, and 45 of *extractive*. The *bark of the root* is thin, in kind of half quills, of an ashy-grey colour on the outside, but yellowish in the inside. It is astringent, but not very bitter. When moistened with water, and rubbed on paper, it leaves a stain which becomes blue when touched with sulphate of iron. According to Wackenroder, this bark contains 2·46 of *rancid fat oil*, 21·92 *tannin*, 26·09 *starch*, with a trace of *lime*, 45·45 *lignin*, and 4·08 loss = 100·00.[1] Latour de Trie mentions *gallic acid; mannite*, which he has termed *Granadin; wax* and *chlorphylle*, as amongst its constituents.[2]

Medical properties and uses. — All the parts we have described are astringent. The two former are administered in decoction in chronic and colliquative diarrhœa, and the protracted stage of dysentery. They are supposed to prove beneficial also in checking the violent sweating which accompanies hectic fever; but the chief use of the decoction is as an injection in leucorrhœa, or as a gargle in sore throats, after the local inflammation is moderated. Dr. Buchanan has stated that the bark of the *root* of the plant has been long used by the natives of Hindostan, and, according to M. Deslandz, by the negroes of St. Domingo, for expelling tape-worm: and its utility for this purpose has been fully confirmed by the experiments of Mr. Breton[3], Dr. Gomes of Lisbon, and Dr. Wolff of Bonn.[4] Mr. Breton gave it in the form of powder, in doses of ℈ j., and of decoction prepared by boiling ℥ ij. of the bark in O jss. of water, and reduced to f ℥ ix., of which, when cold, a glassful was given every half hour, until four doses were taken. The action of the remedy is generally accompanied with nausea. The worm was generally voided alive, a few minutes after the last dose. Celsus says it was used by the ancients for a similar purpose.[5] The bark and flowers are given in the form of powder, in doses of a scruple increased to a drachm; or of a decoction made with ʒ iv. of the bark and f ℥ vj. of water, f ʒ vj. may be given for a dose every three hours.

Officinal preparations. — *Decoctum Granati*, L. *Decoctum Granati Radicis*, L.

PYRETHRUM. See *Anacyclus*.

PYROLA UMBELLATA. See *Chimaphila*.

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[1] *Gmelin, Handb. de Chim.* ii. 1272. [2] *Journ. de Pharm.* xvii. 533—601.
[3] *Vide Medico-Chirurg. Trans.* vol. ii. p. 301.
[4] *Hufeland's Journal*, Aug. 1825. [5] Vide *Celsus de Medicinâ*, lib. iv. § xvii.

QUASSIA. *Spec. Plant. Willd.* ii. 567.

Cl. 10. *Ord.* 10. Decandria Monogynia. *Nat. ord.* Simarubiaceæ.

G. 849. *Flowers* hermaph. *Calyx* short, with five deep-divided segments. *Petals* five.

Species 3. *Picræna excelsa,* Jamaica Quassia. *Trans. Roy. Soc. Edin.* iii. 205—210. *t.* 6. *Lindley,* 208. *Hayne,* ix. 16.

Officinal. QUASSIA, *Lond. Edin. Dub.* The wood of Quassia.

Syn. Bois du Quassie, Bois du Surinam (*F.*), Bitterholz, Quassienholz (*G.*), Vestindisk bittertræe (*Dan.*), Kvassia visocaia (*Russ.*), Legno della Quassia (*I.*), Leno de Quassia (*S.*), Pao de Quassia (*Port.*).

Although the wood of Quassia *amara* has long since ceased to be an article of importation, yet the Edinburgh College still retains it as the occasional source of Quassia. The Quassia *excelsa* was first pointed out by Adr. de Jussieu not to be a Simaruba, under which genus it had been placed. Dr. Lindley, therefore, formed it into a distinct genus, which he named Picræna [1], and to which the London and Dublin Colleges now refer the wood.

This species of Picræna grows in the natural woods of Surinam, Jamaica, and the Carribean islands, and flowers in October and November. It is a beautiful forest tree, rising sometimes one hundred feet in height, with a straight, smooth, tapering trunk, often ten feet in circumference near the base, and covered with a smooth grey bark. The leaves are pinnate, consisting of from five to eight opposite pairs of leaflets, with a terminal leaflet; they are oblong and pointed; the ribs reddish; and the young leaves are covered with a fine brown down. The petioles are not winged. The flowers are in clusters from the lower part of the last shoot before the leaves; they are small, of a yellowish-green colour, with a very small calyx: the male flowers are nearly similar to the hermaphrodite, except that they have the rudiments only of a style. The fruit is a small black drupe, round, the size of a pea, and attached in threes, sideways, to a round fleshy receptacle: it is ripe in December, and is not bitter.[2] The wood is sent to this country in billets, and is reduced to chips, or rasped by the druggists.[3]

Qualities. — Quassia wood is inodorous, and has an intensely bitter taste; it is of a pale-yellow colour. Alcohol and water take up its bitterness, and, when evaporated to dryness, leave a brownish-yellow, somewhat transparent, brittle extract, which has been regarded as a vegetable constituent *sui generis,* and named *quassite* or *quassin,* or the bitter principle.[4] When pure, it is in small, opaque, white crystalline prisms, which are inodorous, and intensely bitter. Soluble in about 200 parts of water, in alcohol, and to a small

[1] *Lindley, Med. Flor.* 208. [2] *Edin. Phil. Trans.* iii. 207.

[3] It is asserted, that of late years the brewers have used quassia wood instead of hops. But as it possesses no astringency, beer made with it certainly does not keep, soon becomes muddy, flat, has a mawkish taste, and runs into the acetous fermentation. Mr. Brande says, an infusion of quassia sweetened with brown sugar is an effectual poison for flies. — *Manuel,* p. 46.

[4] *Thomson's Chemistry,* 4th edit. v. 32.

extent in ether. Quassine is neutral, possessing no power of saturating acids, but rendered more soluble in water both by acids and alkalies. It is stated by Wiggers[1] to consist of C^{20} H^{12} O^{6}. It can be procured by the following process: — Infuse lb.ij. of quassia wood in repeated quantities of boiling water, as long as it yields any bitterness, and evaporate to nearly an extract: then add lime-water; filter; evaporate to an extract, and treat the residue with alcohol. Distil off the alcohol, and again dissolve in alcohol with ether; and repeat this if very pure crystals be not procured. The infusion of quassia is rendered muddy by nitrate of silver, a soft, flaky, yellow precipitate being formed; acetate of lead causes a copious white precipitate; but it is not affected by potassio-tartrate of antimony, nor sulphate of iron, nor gelatine. Dr. Christison states that from the true quassia he has not been able to procure it.

Medical properties and uses. — Quassia is stomachic and tonic; assisting digestion, and giving vigour to the general habit. It has been found efficacious in dyspepsia and nervous irritability, intermittent and bilious remittent fevers, chlorosis, diarrhœa; and, when combined with cretaceous powder and ginger, in atonic gout. It does not sensibly quicken the circulation, nor augment the animal heat. We have given it, combined with nitric acid, with evident benefit in typhus, gout, and also in fluor albus. Quassia would probably act as a narcotic on man if administered in large doses: when introduced even into the cellular tissue of some animals, in the form of an alcoholic extract, it has caused death with narcotic symptoms. The infusion also possesses the property of destroying flies. Its infusion is a good vehicle for the salts of quina, in intermittents. Infusion is the best form of administering quassia; the raspings, for it cannot be properly pulverised, being too bulky: but it may, nevertheless, be given in substance in doses from grs. x. to ʒ j. three or four times a day.

Officinal preparations. — *Extractum Quassiæ*, E. *Infusum Quassiæ*, L. E. D. *Tinctura Quassiæ excelsæ*, E. *Tinctura Quassiæ composita*, E.

QUASSIA SIMARUBA, or SIMARUBA AMARA. See *Simaruba.*

QUERCUS. *Spec. Plant. Willd.* iv. 423.

Cl. 21. *Ord.* 6. Monœcia Polyandria. *Nat. ord.* Cupuliferæ.

G. 1692. *Male. Calyx* commonly five-cleft. *Corolla* none. *Stamens* five to ten.

——— *Female. Calyx* one-leafed, entire, rough. *Corolla* none. *Styles* two to five. *Nut* coriaceous, surrounded at the base by the persistent calyx.

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[1] *Ann. de Pharm.* xxi. 40.

** *With toothed leaves.*

Species 33. Q. *infectoria*. Dyer's Oak. *Olivier's Travels* (*translation*), i. 41. *t.* 14, 15. *Med. Bot.* v. *p.* 4. *t.* 2. *Hayne*, xii. 45.

***** *With sinuated leaves and beardless lobes.*

Species 65. Q. *pedunculata*. Common British Oak. *Med. Bot. 3d edit.* 23. *t.* 10. *Michaux, North American Sylva*, vol. i. pl. 2. (*Q. Robur.*) *Smith, Flora Brit.* 1026. *Michaux*, b. c. *Hayne*, vi. 35.

1. QUERCUS INFECTORIA.

Officinal. GALLÆ, *Lond. Edin. Dub.* Nut galls, excrescences formed on the twigs of the Quercus Infectoria, excited by the *Cynipe Gallæ Tinctoriæ* or *Diplolepis Gallæ Tinctoriæ.*

Syn. Noix de Galle (*F.*), Galläpfel (*G.*), Galnoot (*Dutch*), Galaebar (*Dan.*), Gallaplen (*Swed.*), Ischernilnoie orechi (*Russ.*), Galla (*I.*), Agallas de Levante (*S.*), Galhas (*Port.*), Maju P'hal (*H. & San.*), Machākāi (*Tam.*), Afis (*Arab.*), Mazu (*Pers.*), Māphul (*Duk.*).

It is well known that most of the other species of Quercus produce galls, yet the species from which the galls of commerce are obtained has been distinctly pointed out by Olivier[1] from his personal knowledge, and is that above named. As we know no reason for doubting his veracity, we shall copy his description of it.

The Quercus *infectoria* is scattered throughout all Asia Minor, from the Bosphorus as far as Syria, and from the coasts of the Archipelago as far as the frontiers of Persia. It has a crooked stem, seldom exceeds six feet in height, and more frequently assumes the character of a shrub than that of a tree. The leaves, which are deciduous in Autumn, are on short petioles, smooth, of a bright green colour on both sides, and obtusely toothed; the acorn is elongated, smooth, two or three times longer than the cup, which is sessile, in a slight degree downy and scaly: the gall is formed on the shoots of the young boughs, and acquires from four to twelve lines in diameter; the insect which produces it is the *Cynips quercusfolii* of Linnæus (*Diplolepis gallæ tinctoriæ* of Geoffroy), a small hymenopterous insect or fly, with a fawn-coloured body, dark antennæ, and the upper part of the abdomen of a shining brown. The insect punctures the tender shoot with its *terebra*, or borer, which is spiral, and deposits its egg, in conjunction with an acrid fluid, in the puncture. This occasions a morbid irritation in the vessels of the part, and a flow of juices towards it; the gall rises in a few hours, and attains its full size in a day or two, before the larva is hatched: the egg grows with the gall: and it is by the irritation which it keeps up, — not, as has been supposed, by the maggot feeding on the juices of the plant, — that the morbid excitement is maintained in the vessels of the part, sufficient for the production of this kind of vegetable wen. When the insect is perfected, it eats its way out of the gall.

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[1] *Voy. dans l'Empire Ottom.* t. ii. p. 64.

Galls are gathered before the larva within them changes to a fly, and eats its way out; for, when this has happened, the galls have become lighter, and contain less of the astringent principle. The galls from which it has escaped have a circular hole, in size about a line in diameter. The first galls that are picked are named *yerli* by the natives, and are known in trade by the terms *black* or *blue galls* and *green galls*. They vary in size and aspect, but all of them are entire. Those which are gathered afterwards, from the circumstance of their being pierced, are of an inferior quality, and are denominated *white galls*. The best galls are those of Aleppo, Smyrna, Magnesia, Karahisser, Diarbekir, and the interior of Natolia. Those which are brought to this country come chiefly from Aleppo, in bags and cases.

Qualities. — Galls are inodorous, and have a bitter, very astringent taste. They are nearly round, of different magnitudes, from the size of a pea to that of a hazel-nut; smooth on the surface, yet studded with tuberosities; and, when good, of a blackish-blue or deep-olive colour: a white or a red hue indicates an inferior quality.[1] They are heavy, brittle, break with a flinty fracture, and display a compact, striated texture. The whole of their soluble matter is taken up by about forty times their weight of boiling water, and what remains is tasteless. The decoction, on cooling, deposits a pale yellow precipitate, which is a *tannate of starch*. Alcohol, digested on powdered galls, takes up seven parts in ten, and ether five parts. The watery infusion reddens tincture of litmus, and forms precipitates with solution of isinglass (*gelatin*), the infusions of cinchona bark, opium, cusparia bark, and columba root; but not with infusion of quassia, nor of saffron. Sulphuric acid throws down a yellowish, curdy, and hydrochloric acid, a flaky, whitish precipitate; while nitric acid changes the colour only of the infusion, first to a deep orange, and afterwards to a paler orange yellow. The solution of ammonia occasions no precipitate, but deepens the colour: the carbonate, however, produces a precipitate. Carbonate of potassa throws down a yellowish, flaky precipitate, and extricates ammonia; and lime-water a copious deep bluish-green precipitate. Precipitates also are formed with solutions of quina, cinchona, morphia and the salts of morphia, emetia, and of the following metallic salts: acetate and diacetate of lead, greyish; potassio-tartrate of antimony, yellowish; sulphate of copper, brown; sulphate of iron, bluish-black; sulphate of zinc, reddish-black, but it is very slowly formed; nitrate of silver, deep-

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[1] This is the character of the galls from which the insect has escaped, and which are also of a brighter colour. Another kind of gall, produced by another species of the insect, is also, Olivier says, found on the same oak. It is spongy, very light, of a brown-red colour, covered with a resinous coat, and furnished with a circular row of tubercles placed nearly towards the most protuberant part. Their astringency is very inferior, and they are used only to adulterate the better sort.

olive; and nitrate of mercury, bright yellow. The bichloride of mercury renders the infusion milky and opaque, but no precipitate falls. The alcoholic tincture of galls reddens litmus, and is affected by the same re-agents as the watery infusion. The ethereal tincture, when evaporated on water, leaves on the side of the glass an opaque pellicle, and on the surface of the water small drops of an oily, resinous-like matter, while the substratum of water becomes charged with tannic acid. The pellicle and resinous-like matter is plastic, tenacious, resembling birdlime treated with ether; and when subjected to heat, it melts and chars. In Sir H. Davy's experiments 500 grains of Aleppo galls yielded to pure water, by lixiviation, 185 grains of solid matter; of which 130 were *tannin*, 31 *gallic acid* and *extractive*, 12 *mucilage* and matter rendered insoluble by the evaporation, and 12 *saline* and *earthy matter*. From different experiments, the proportion of *extractive*, however, if any, is very small: none appears in the evaporation of the ethereal tincture; and Dr. Bostock's experiments render the existence of *mucilage* very doubtful. From the experiments of Professor Branchi, it appears that galls also yield, by distillation with water, a concrete volatile oil[1]: and M. Braconnot discovered in them a new acid, which he rather affectedly termed *ellagic*, from the word *galle* reversed![2] It is an insipid, inodorous, white powder, with a slight tinge of red, and insoluble in boiling water. When mixed with nitric acid, and very gently heated, the mixture acquires a reddish tint, gradually passing into a deep blood-red. The experiments of Pelouze have thrown much light upon this subject, and suggested, with probability, that galls contain no ready-formed gallic acid; but that, in every instance, that acid is formed by the decomposition of the tannic acid. This acid, when pure, is in masses, much resembling crystallization, of a pale yellowish hue; soluble in water, and in proof spirit, but not very soluble in ether. (See *Tannic acid*, Part III.) The solution forms precipitates with all the re-agents which act upon infusion of galls. When its solution is exposed to the air, it attracts oxygen, is decomposed and converted into gallic acid. (See *Gallic acid*, Part III.) If gallic acid be a product of the decomposition of tannic acid, it is most probable that this is the case, also, with *ellagic acid*, which is supposed to be contained in galls. When powdered galls in a long filter are acted on by unrectified ether, and the percolated fluid evaporated, and reacted upon by alcohol, pure tannic acid is obtained[3]; and if the galls be good, and they are wholly exhausted, 60 per cent. of tannic acid may be procured. For the properties and composition of *Tannin* or *Tannic acid*, and of *Gallic acid*, see Part III.—Acids.

Ellagic acid has been found to form the Oriental Bezoar,—a

[1] *Phil. Mag.* vol. ix. p. 401.

[2] *Ann. de Chim. et Phys.* ix. p. 187.

[3] *Ann. de Chim. et de Phys.* liv.

concretion found in the intestines of a wild goat, and doubtless derived from the astringent substances of the food.

Formula $C_{14}\ H_2\ O_7 + 3\ H\ O$ or $C_7\ H_2\ O_4$ dried at 248° F.

Medical properties and uses. — Galls are the most powerful of the vegetable astringents. They are seldom used as an internal remedy, although, in combination with bitters or aromatics, they have been given in obstinate diarrhœas, passive intestinal hæmorrhages and intermittents. They are frequently ordered in the form of gargles and injections; and an ointment formed of galls in fine powder, with eight parts of simple ointment and a small proportion of powdered opium, is a useful application to blind piles. A strong decoction applied to warts on the penis destroys them: this use of galls was proposed by M. Alcock.[1] For internal exhibition, the dose of galls is from grs. x. to ℈j., which may be given twice or thrice a day. I have used *gallic acid* for several years in hæmorrhages with decided advantage, in doses of from grs. iv. to grs. x., administered in any bitter infusion, or even in water. Its use was suggested to me by discovering it to be the active principle in Ruspini's styptic, which had been often given with advantage in internal hæmorrhages.[2]

Officinal preparations. — *Decoctum Gallæ*, L. *Tinctura Gallæ*, L. D. *Tinctura Gallarum*, E. *Unguentum Gallæ comp.*, L. *Unguentum Gallæ et opii*, E. *Unguentum Gallæ*, D.

2. QUERCUS PEDUNCULATA.[3] Q. ROBUR.

Officinal. QUERCUS CORTEX, *Lond. Edin. Dub.* Oak bark.

Syn. Ecorce de la Chênecommune (*F.*), Eichenrinde (*G.*), Corteccia della Quercia (*I.*), Roble (*S.*), Eikenboom (*Dutch*), Ek (*Swed.*), Egetrae (*Dan.*), Dub obiknovennoi (*Russ.*).

This species of oak is indigenous; but it is found also all over Europe, in the north of Asia, and the northern extremity of Africa. It is a well-known magnificent tree, often rising to the height of 90 or 100 feet, and attaining a great degree of thickness in the trunk, which is covered with a rough, brown bark. The leaves are alternate, supported on short petioles, ovate-oblong, deeply sinuated, forming obtuse lobes, each lobe having a single green midrib, proceeding from the common midrib; deep green, smooth, and shining on the upper surface; paler, and nearly glaucous underneath. The male flowers are in axillary catkins; lax,

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[1] Misy quoque et Galla, si puribus portionibus misceantur, corpus consumunt. — *Celsus*, l. v. c. xxii.

[2] The Editor is informed by Mr. P. Squire that Ruspini's styptic, as at present prepared, contains neither tannic nor gallic acid.

[3] Δρυς Græcorum, *Eiche* (G.), *Eik* (Dutch), *Eeg* (Dan.), *Ek* (Swed.), *Darach* (Gaelic), *Le Chêne* (F.), *Quercia* (I.) *Roble* (S. Port.), *Dub.* (Russ.), *Mesche* (Turk.). *Baalut* (Arab.), *Tamma* (Finnl.), *Pelut* (Pers.).

pendulous, many-flowered, and yellow; the female separate, peduncled, and only three-flowered. The calyx of the male flower is membranous, bell-shaped, often five-cleft; while that of the female is coriaceous, scaly, downy, and becoming hemispherical, entire, and woody. The stamens are ten, longer than the calyx. The germen is ovate, crowned with a short conical style and three obtuse recurved stigmas. The fruit is an elliptical, coriaceous, smooth nut, fixed in the calyx as in a shallow cup, but at length dropping from it. The peduncles of the fruit, which are from two to three inches long, distinguish it from the Q. *sessiliflora,* the fruit of which is sessile. It ripens its acorns in October.

Almost every part of the oak is astringent, but the bark only is officinal; and, as its epidermis is perfectly inert, it is taken for medicinal purposes from the smaller branches, the epidermis of which is still thin, and scarcely cracked. The bark cut in spring is preferable to that which is cut in winter, as it contains four times the quantity of the astringent principle or tannin.[1] The usual time for barking is from early in May to the middle of July. It is separated in pieces of one foot to two feet long, and three or four inches wide. When the epidermis is rough, cracked, and wrinkled, the bark is of an inferior quality.

Qualities. — Oak bark is inodorous, has a rough astringent taste, and yields its virtues to both alcohol and water. The watery effusion is affected by all those tests which indicate the presence of *tannic acid* and *extractive* (see *Decoctum Quercus*). Sir H. Davy[2] found that ℥j. of the inner cortical part of young oak bark affords, by lixiviation, 111 grains of solid matter, of which 77 are *tannin;* the cellular integument, or middle-coloured part, yields grs. 43 only of solid matter, of which 19 are *tannin;* and the epidermis furnishes scarcely any quantity either of *tannin* or of *extractive.* The quantity of tannic acid, however, varies according to the size and age of the trees, and the season at which they are barked. Braconnot found the bark to contain *tannic acid, tannates of lime, magnesia, potassa, gallic acid, uncrystallizable sugar, pectin,* and *lignin.*[3] Vauquelin discovered that the infusion of oak bark does not precipitate potassio-tartrate of antimony, nor the infusion of Santa Fè cinchona, which resembles the officinal red cinchona, although both of these are precipitated by infusion of galls. I find, however, that infusion of oak bark forms a precipitate with infusion of yellow cinchona bark, and with solutions of the salts of quina and cinchona.

Medical properties and uses. — Oak bark is tonic and astringent. It has been given, united with bitters and aromatics, with seeming advantage, in intermittents; but it is in every respect inferior to

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[1] Biggin, *Phil. Trans.* 1799. [2] *Phil. Trans.* 1803.
[3] *Ann. de Chim. et de Phys.* l. 381.

cinchona, and cannot be depended on. It is, however, useful in obstinate diarrhœa and in alvine hæmorrhages; and it is strongly recommended in the malignant coryza (*snuffles*) of infants, when, in spite of keeping the bowels regular, and the use of cordials, the child becomes weak and pallid.[1] Its principal use is as a local astringent. (See *Decoctum Quercus.*) The fine powder of oak bark has been inhaled into the lungs in phthisis and in asthma; but the practice is seldom resorted to.

The dose in substance may be from grs. xv. to grs. xxx.; but it is so difficult to pulverize, that it is seldom given in this form.

Officinal preparation.—*Decoctum Quercus,* L. E. D.

QUINA. See *Cinchona,* Part II., *and Alkaloids,* Part III.

QUINÆ DISULPHAS. *Lond.* See Part III.

RANUNCULUS. *Spec. Plant. Willd.* iv. 1307.

Cl. 13. *Ord.* 6. Polyandria Polygynia. *Nat. ord.* Ranunculaceæ.
G. 1086. *Calyx* five-leaved. *Petals* five, with a melliferous pore within the claws. *Seeds* naked.
* *With simple leaves.*
Species 1. R. *Flammula.* Lesser Spearwort. *Eng. Bot. t.* 387. *Fl. Dan. t.* 575. *Curt. Fl. Lond.* 6. *t.* 37. *Med. Bot.* v. 5. *p.* 54. *t.* 15. *Roque,* 118.
** *With divided leaves.*
Species 45. R. *acris.* Upright Meadow Crowfoot. *Eng. Bot. t.* 652. *Curt. Flor. Lond.* 1. *t.* 39. *Med. Bot. 3d edit.* v. 3. *p.* 482. *t.* 172. *Roque,* 118.

1. RANUNCULUS FLAMMULA.

RANUNCULUS FLAMMULA; HERBA RECENS. The fresh herb of Lesser Spearwort. Officinal in Dublin Pharmacopœia, 1826.

Syn. Renoncule petite Douve (*F.*), Hahnenfuss (*G.*), Ranuncolo (*I.*, *S.*).

This indigenous species of ranunculus is common in moist and marshy places; flowering in May and June, and continuing in flower the greater part of the summer. The root consists of long, simple fibrils, united in fascicles. The stems are spreading, somewhat decumbent, round, smooth, branching, and leafy. The leaves are alternate, lanceolate, and supported on long, channelled petioles, dilated at the base, at the lower part of the stem, but linear-lanceolate on the upper; pointed, smooth, sometimes entire, occasionally sparsely serrated. The flowers are of a bright-yellow colour, shining, supported on the extremities of the stems, solitary,

[1] Underwood, *Diseases of Children,* 4th ed. i. 45.

or on bifurcated peduncles. The calyx is reflex and smooth; the nectary is minute; the seeds are smooth.

Qualities. — Like all the species of ranunculus, lesser spearwort is acrid and caustic; but its acrimony disappears as the seeds ripen, is diminished by drying, and altogether destroyed by boiling water.

Medical properties and uses. — The fresh herb is rubefacient and epispastic: the distilled water is emetic, and is recommended by Dr. Withering as the best emetic in cases of poisoning: he says that it operates as rapidly, and with less distress to the patient, than sulphate of zinc.

2. Ranunculus acris.

Ranunculis acris, folia. The leaves of Upright Meadow Crowfoot. Not now officinal.

Syn. Bouton d'Or (*F.*).

This species of ranunculus is also indigenous. It is common in meadows and waste places; flowering in June and July. The root has a tuberous crown furnished with long simple fibres. The stem is erect, about two feet in height, somewhat villous, furnished with few leaves, and branching above, and many flowered. The leaves are tripartite, quinquepartite, and multifidous; the radical leaves are supported on long petioles; the upper are nearly sessile and linear. The flowers are terminal, large, of a brilliant yellow colour, supported on round hairy peduncles. The calyx is spreading and hairy; the nectary is covered with an emarginate scale.

Qualities. — The leaves are bitter and acrid to the taste [1]; and inflame the skin when they are applied to it.

Medical properties and uses. — The leaves of upright meadow crowfoot are rubefacient. They are bruised and applied as a remedy in scabies, and some other cutaneous diseases, in Norway; and in Iceland they are used as a vesicatory

RESINA. See *Pinus.*

RHAMNUS. *Spec. Plant. Willd.* i. 1092.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Rhamnaceæ.

G. 405. *Calyx* tubular. *Corolla* scales defending the stamens, inserted into the calyx. *Berry.*

* *Thorny.*

Species 1. R. *catharticus.*[2] Purging Buckthorn. *Med. Bot. 3d edit.* 594. *t.* 210. *Hayne,* v. 43.

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[1] With the exception of the bison (Bos *Urus*), which feeds by preference on the ranunculi, all cattle leave this plant untouched, however scanty their pasture may be; indeed, all the species of ranunculus are equally rejected.

[2] *Purgierdorn* (G.), *Purgerende wegedoorn* (Dutch), *Korsbaerton* (Dan.) *Gelappel* (Swed.), *Ramno cartico* (S.), *Escambrociro* (Port.), *Pridoroschnaja igolka* Russ.), *Szaklak krzewia* (Pol.).

Officinal. RHAMNI SUCCUS, *Lond.* Juice of Buckthorn. RHAMNI BACCÆ, *Edin.* Buckthorn berries.

Syn. Nerprun (*F.*), Kreutz dorn (*G.*), Wegedoorn (*Dutch*), Getappel (*Swed.*), Korsbaer (*Dan.*), Pridoroschnaia igolka (*Russ.*). Bacche del spino Cervino, Ranno (*I.*), Ranno catartico (*S.*), Escambroeira (*Port.*).

This is an indigenous shrub, growing in woods and hedges near brooks; flowering in May and June, and ripening its fruit in October. It rises with a strong, rigid, woody stem, sending off alternate round branches, which terminate in a spine. The leaves are in fascicles, on footstalks, ovate, serrated, nerved; and the younger are downy: the flowers come from the same buds as the leaves; they are peduncled, of a greenish-yellow colour, four-cleft; and frequently, but not always, they are male and female upon different plants: the anthers are round, on short filaments which rise from the base of a small convex scale: the germen is ovate, with a slender style and four-cleft stigma: the fruit is a small, round, black, four-seeded berry, about the size of a pea, compressed on one side.[1]

These berries are said to be often mixed with those of the black-berried alder and of the dogberry tree: but as the buckthorn berry has four cells and seeds, while the others have only two and one, it can be easily distinguished.

Qualities. — The odour of these berries is faint and unpleasant; the taste bitterish, acrid, and nauseous. They are very succulent, and yield by expression a deep-green juice, or a purple juice if they be gathered late in the autumn; but it soon ferments, acetic acid is formed, and the juice becomes red. According to an analysis of Hubert, this juice contains *green colouring matter, acetic* and *malic acids, brown gummy matters, sugar* and a *bitter substance.*[2]

Medical properties and uses. — The berries, and their expressed juice, are briskly carthartic; but their operation is accompanied with thirst and severe griping, which is not altogether mitigated by the most plentiful dilution. They were formerly much used as a hydragogue purgative, but are now very seldom prescribed. The dose of the recent berries is ℈j., of the dried ʒj., and that of the expressed juice f ℥j.

Officinal preparation.—*Syrupus Rhamni*, L. E.

RHATANIA. See *Krameria.*

RHEUM.[3] *Spec. Plant. Willd.* ii. 488.

[1] The pigment called sap green is the inspissated juice of this berry, with the addition of an alkali or lime.

[2] *Journ. de Chim. Med.* vi. 196.

[3] Ῥῆον Dioscoridis. The rhubarb of the Greeks was the root of Rheum *Rhaponticum.*

Cl. 9. *Ord.* 3. Enneandria Trigynia. *Nat. ord.* Polygonaceæ.
G. 803. *Calyx* none. *Corolla* six-cleft, persistent. *Seed* one.
Sp. 2. R. *undulatum.* Waved-leaved Rhubarb. *Amœn. Acad.* iii. 212. *t.* 4. *Hayne,* xiii. 8.
Sp. 3. R. *palmatum.* Palmated Rhubarb. *Med. Bot. 3d edit.* 662. *t.* 231. *Phil. Trans.* iv. 292. *t.* 12, 13. *Hayne,* xii. 10.

The opinions respecting the origin of the rhubarb imported into this country are still very unsettled. On this account the British Colleges have wisely abstained from naming any particular species of rheum as that which yields it.[1] It is not unlikely that foreign rhubarb is taken from several species: that which we receive by way of Canton, which certainly differs, more than simply in the drying, from that which comes through Russia.

1. Rheum undulatum.

This species of rheum was supposed by Kauw Boerhaave to be the true Chinese rhubarb, as the seeds came from a Tartar merchant; but experience has demonstrated that it is not the source of the genuine rhubarb. It is a native of China and Siberia, but grows well in this country. The root divides into a number of thick fibres, which run deep, and are extremely yellow within; the leaves, which appear early in the spring, are supported on moderately thick footstalks, channelled on their under side, and plain on their upper: the leaves are oval, obtuse, much waved on their edges, a little hairy on the upper surface, and very strongly veined and downy on the under: the flower stem is of a pale brownish colour, rising about four feet high, and dividing into several loose panicles, or bunches of white flowers, which appear in May, and are succeeded by triangular seeds that ripen early in the season. It is cultivated in France, and furnishes much of the *French rhubarb.*

2. Rheum palmatum.

This species, like the former, is a native of China and Tartary: it is said to grow on the snowy mountains of Boutan and of Dauria, and arrives at considerable perfection when cultivated in this country. The root is perennial, thick, oval, branched, externally brown, and internally of a deep yellow colour: the stem, which rises eight or ten feet in height, is erect, round, hollow, jointed, very slightly furrowed, and maculated with small, oblong, purple streaks; the lower leaves stand upon long smooth petioles[2]; are numerous,

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[1] Some seeds given by a dealer in rhubarb to Kauw Boerhaave yielded plants both of the R. *undulatum* and the R. *palmatum.* There is no evidence that either of these supply the officinal rhubarb.

[2] The petioles of this species make a much better tart than those of R. *undulatum,* the species generally employed by the pastrycook.

large, divided into five segments, which are deeply sinuated, toothed, and strongly ribbed, the petiole being divided at its apex into the five midribs of the segments; of a deep green colour, rough above, and pale and villous below: those of the stem spring from the joints; they are also petiolate, and gradually lessen in size towards the top of the stem: there is a sheathing stipule or *ochrea* at the base of each stem-leaf.[1] The flowers spring from the axilla of the base in numerous panicled clusters: they appear in May; the corolla is divided into six obtuse segments, of a greenish-white colour, tinted with light pinkish purple: the filaments are nine, slender, the length of the corolla, and furnished with oblong double anthers: the style is short, with three reflected capitate stigmas; and the ovary contains one triangular ovule: the fruit is triangular, with three membranous reddish margins or alæ.

This plant has been generally believed to be the species which yields the foreign rhubarb: and, under this belief, a very excellent and correct description of it was given by Dr. Hope, Professor of Botany at Edinburgh, in the Philosophical Transactions for 1765. He had raised it from seed sent to him by Dr. Mounsey from Petersburgh two years before, and found that the root possessed all the medicinal qualities of the best foreign rhubarb. Since that period many laudable attempts have been made to introduce the cultivation of rhubarb into this country, in sufficient quantity to supply our domestic consumption of this valuable drug: but although many individuals have reared large quantities, and some of it has been tolerably good, yet it is inferior to the foreign rhubarb; so that very little of it can be sold, and the efforts, therefore, of the cultivators have of late very much relaxed.[2] It is still, however, uncertain which of the species of rheum yields the foreign rhubarb; nor is it of very great importance, as the roots of the two species above described, and of another, the R. *australe* or *Emodi*, accord so very closely in their medicinal powers, that any of them may be used with equal certainty of success.[3] The R. *compactum* is said to accord with the accounts given by the Bucharians of the plant and the form of the leaf, which, according to

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[1] Qy. Whether the floral envelope is calyx or corolla? — It is white at first, becomes red and succulent, and is persistent.

[2] For an excellent account of those different trials, and some very judicious observations on the mode of cultivating rhubarb, see *Miller's Dictionary*, edited by Dr. Martyn, article *Rheum.*

[3] The latest account of rhubarb is given by my friend and late pupil, Professor Royle, in the Calcutta Medical Transactions for 1827. He says one species, R. *Emodi* of Wallich, is found in great abundance on the Chur mountain, at an elevation of 9,000 feet. He adds, "the table land of Tartary is covered with rhubarb at the height of 16,000 feet; and there is abundance at Ludak, in lat. 37°, whence some of very fine quality was sent to Captain Kennedy by Mr. Moorcroft. — *Trans. of the Med. and Phys. Soc. of Calcutta*, vol. iii. p. 440. Professor Royle does not think that R. *Emodi* yields the officinal rhubarb.

Sievers, they describe as round, dentated on the margin, with almost spinous processes, but it has a white root. But M. Calau, the Russian apothecary at Kiachta, says that their information is not to be depended upon, owing to the severe prohibition of the Chinese government. The R. *Rhaponticum*, which is supposed to be the rhubarb of the ancients, yields good rhubarb.[1]

Officinal. RHEUM, *Lond. Edin. Dub.* Rhubarb. The root of undetermined species of Rheum. Sinense (Chinese), *L.*[2]

Syn. Aechte Rhabarber (*G., Dan., Dutch, Swed.*), Rabarber, Reven (*Russ.*), Rhabarbaro (*I.*), Ruibarbo (*S., Port.*) Haihoung, or E-Tah-ro-ang (*Chinese*), Daiwoo (*Japan.*), Variātoo Kālung (*Tam.*), Ruwend (*Arab.*), Reywand (*Pers.*), Réwund Chini (*Duk.*).

Three principal varieties of rhubarb are known in the shops, named from the places whence we receive them; *Russian* or *Turkey* rhubarb, *East Indian* or *Chinese* rhubarb, and *European* rhubarb.

All the rhubarb of commerce[3], known under the names Turkey or Russian, grows wild on the declivities of the chain of mountains of Chinese Tartary, which stretch from the Chinese town Si-ning to the Lake Koko Nor, near Thibet, the source of the river Chou-cho. The soil is light and sandy; and the Bucharians assert that the best grows in the shade, on the southern side of the mountains. Rhubarb, however, is also cultivated in China, in the province of Shen-see, where it is called *haihoung*. In Tartary the roots are not taken up until they are six years old, when they are dug up twice a year, in spring and in autumn[4]; and after being

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[1] The following species of Rheum have also been regarded capable of yielding rhubarb: R. *Webbeanum*, R. *spiriforme*, R. *Moorcroftianum*, R. *crassinervium*, R. *leucorhizum*, and R. *capsicum*. The only species which has a root that, when dried, closely resembles the real *Russian* rhubarb is the R. *palmatum;* and time, probably, will at length determine that this plant is the source of genuine rhubarb.

[2] In the *London Pharmacopœia* for 1836, no special variety of rhubarb is named, but in 1851 the London College has appended the term Sinense (Chinese), to indicate the variety of rhubarb intended to be made use of. By Chinese rhubarb, however, it does not wish it to be understood that the rhubarb known in commerce by the name of Chinese or East Indian is to be exclusively employed, but either what is commonly known as Turkey or Russian, or the so-called Chinese or East Indian. The following extract from a letter which the Editor received from Dr. F. Farre, who kindly explained the value which the London College wished to have attached to the term *sinense*, will best illustrate the meaning:—"The term *sinense* was placed after rheum, to include the so-called Russian and East Indian rhubarbs, which are considered to be the produce of China and Chinese Tartary, and to exclude European, Himalayan, &c.; even the Dutch trimmed or Batavian rhubarb may be included, as it is very similar to the East Indian rhuharb of the shops, and probably comes from the same quarter, though differently prepared."

[3] The best treatise on the Commerce of Rhubarb, and from which much of the information contained in this article has been taken, is from the pen of Dr. Rehman. Vide *Mém. de la Société Impériale des Nat. de Moscow*, 1809, t. ii. p. 126.

[4] *Bell's Travels.*

cleansed and decorticated, and the smaller branches cut off, the body of the root is divided transversely into pieces of a moderate size, which are placed on tables, and turned three or four times a day, during five or six days. A hole is then bored through each piece, by which it is hung up to dry, exposed to the air and wind, but sheltered from the sun. In Bontom they are hung up in moderately heated drying-rooms. In about two months the roots have lost seven parts in eight of their weight [1], and are fit for the market. In China the roots are not dug up till winter [2]; and the cultivators, after cleaning, scraping off the bark, and cutting them, dry the slices by frequently turning them on stone slabs heated by a fire underneath; after which the drying is completed by hanging them up in the air, exposed to the greatest heat of the sun. [3] As soon as the rhubarb has been dried where it is grown, it is conveyed to Si-ning, where it is again cleaned and aired: and after being cut into smaller pieces and sorted, a large hole is drilled through that intended for the Russian market, in virtue of the contract made with the Russian government, for the examination of the heart of the pieces. It is then packed up in camel's hair sacks, each containing about 200 lb., and conveyed to Macmatchin, where it is examined previously to its being transported to Kiachta. The whole of the trade in rhubarb in China is carried on by one Bucharian family, which has enjoyed the monopoly since 1772; and it is even by the agents of this family that it is sold to the English at Canton. This Bucharian family resides at Si-ning Fu, a town on the frontiers of Thibet, about 3000 versts from Kiachta, the town on the Russian frontier where the rhubarb is purchased on the account of the Russian government. Part of the Tartarian rhubarb is carried to Turkey through Natolia; thence the name Turkey rhubarb: but the greater part is conveyed by the Bucharians to Kiachta, where it is examined by a Russian apothecary. All pieces that are porous, of a grey colour, and all those taken from young plants, and of a pale colour, are rejected. The rhubarb is then pared and perforated, to examine the interior of the pieces. The best pieces only are selected and sent to St. Petersburgh. The pieces which are roundish are usually more liable to decay than the flat pieces, and on that account they are perforated with a large hole; they are of a yellow or reddish

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[1] *Bath Papers*, iv. 175. [2] *Bath Papers*, ii. 249.

[3] It is in the process of drying the roots that the British cultivators of rhubarb are supposed to fail. Baumé proposes to steep the roots in water, to deprive them of their gummy matter, before drying them; then to lay them upon twigs in the open air for twelve hours; and lastly to place them in a stove, heated to 120°, till they are dried. When sufficiently dry, the wrinkles must be rasped out, and the pieces shaken together in a barrel, turned on an axis, for half an hour, which covers them with a fine yellow powder formed by their attrition.

colour on the outside, somewhat soft and friable, and, when broken, exhibit many diverging streaks of a beautiful bright-red colour. Agreeably to the contract with Russia, all the rhubarb which is rejected must be burnt; and even that which is approved must undergo another garbling before it is finally packed up for St. Petersburgh.[1] Much pains are taken in packing the rhubarb to secure it from the air, as it has a strong affinity for moisture. The chests, therefore, sent to Moscow are always pitched on the outside.

The *East Indian* or *Chinese rhubarb*, at least what we receive under that appellation, is conveyed to Canton, and there purchased by the East India Company's agents, who buy all qualities; whence it is brought to this country by sea. It is in oblong, round, and flat pieces, sometimes perforated, but with a smaller hole than the Russian rhubarb; considerably heavier, more compact, and less friable than the former kind; of a brownish-yellow colour on the outside; and when broken, the fracture is hackly, appears of a dull colour, and variegated with yellow, pink, and white. The flat pieces are prepared by rasping the spongy alburnum from the round pieces; and thus prepared the rhubarb sells at one third more than the unrasped root. Both kinds are brought to this country in cases and chests.[2]

An *English* rhubarb is produced at Banbury in Oxfordshire, either from the R. *palmatum* or R. *undulatum;* and is often sold to the public, by persons habited as Turks, as *Turkey rhubarb.* Dr. Pereira states that the rhubarb now grown at Banbury is from the R. *rhaponticum.* It is light and spongy; but dressed, and perforated so as to resemble Russian rhubarb. The powder has a pinkish hue, neither present in the Russian nor the Chinese kinds; and it is slightly deliquescent. It tastes mucilaginous, has no grittiness, and contains scarcely any oxalate of lime. It is chiefly employed to adulterate the powder of the Asiatic rhubarb. In France rhubarb is cultivated from R. *rhaponticum,* and R. *compactum.*

Qualities. — Good *Russian* or *Turkey* rhubarb is in irregular, flat, plano-concave, or cylindrical pieces, always angular on the outside, as if cut with a knife, and often perforated with a round hole. It has a peculiar, somewhat aromatic odour, and a bitter, slightly astringent, subacid taste; feels gritty between the teeth when chewed; and tinges the saliva of a bright yellow colour. Its texture is compact; and it breaks with a rough, hackly fracture, is

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[1] At this examination, each piece is struck with a small mallet, to detach from it any impurities or decayed parts.

[2] The rhubarb which is worm-eaten owes this to a small beetle, Sinodendrum *pusillum.* — *Kirby and Spence's Entom.* vol. i. p. 252.

easily pulverized, and affords a powder of a bright, buff-yellow colour, It should not be porous. Water at 212° takes up 24 parts in 60, forming an infusion of a pale brown colour, nearly clear, reddening litmus paper, and striking a deep brown with alkalies. Alcohol extracts 2·7 from 10 parts, and gives a tincture of a rich golden colour, which reddens tincture of litmus, is not altered in its transparency by the addition of water, and strikes a blackish olive hue with solution of the sulphates of iron, but no immediate precipitate falls. Ether takes up 1·5 in 10 parts of this rhubarb; the tincture is of a golden-yellow hue; and when evaporated on water, it leaves a thin pellicle of yellow resin, and abundance of extractive is dissolved in the water, combined, however, with tannic acid. Nitric acid, added to a strong infusion of this rhubarb, causes a turbidness, and throws down a yellow precipitate, which, when washed and dried, has been named *rhabarberin.* Lime-water throws down a deep red precipitate, which is a compound of rhabarberin and lime. According to the analysis of Hornemann, it contains 10·042 of a *bitter principle,* 9·583 of *yellow colouring matter,* 14·687 *astringent extractive,* 1·458 *oxidized tannin,* 10·000 *mucilage,* 28·333 of a *substance extracted by potassa,* 1·042 *oxalic acid,* 14·583 *lignin,* 0·939 *loss* = 100·000.[1] According to M. Henry the components are, a *yellow colouring matter,* a *bland oil, fecula,* a *small quantity of gum, tannin, lignin, oxalate of lime, supermalate of lime, sulphate of lime,* a *salt of potassa,* and *oxide of iron.*[2]

East Indian or *Chinese* rhubarb has a stronger odour, tinges the saliva of an orange hue, and is more nauseous to the taste than the Turkey; breaks with a more compact and smoother fracture, and affords a powder of a redder shade. Water takes up 30 parts in 60; the infusion is not so deep-coloured as that of Russian rhubarb, is more turbid, reddens also litmus paper, and is browned by alkalies. Alcohol extracts 4 parts in 10; the tincture is of a deep colour, and brownish; gives a deep red to litmus tincture; is rendered slightly turbid by the addition of water; and strikes a green, not blackish olive, with sulphate of iron, which it also quickly and copiously precipitates. Ether takes up 2 parts in 10; the tincture is deep-coloured; and, when evaporated on water, affords the same results as the former kind, except that the compound of tannin and extractive is more soluble.

The infusion of Chinese rhubarb is more copiously precipitated by solution of isinglass than that of the Russian. Infusion of yellow cinchona bark throws down a copious greenish precipitate

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[1] *Berlin Jarb. B. D.* xxiii. 3. 252. 1822. [2] *Bulletin. de Pharm.* t. vi. p. 87.

from infusion of Russian rhubarb, and a less copious, but more dense, bright-yellow precipitate from that of Chinese rhubarb. According to Brande, the components of Chinese rhubarb are 2·0 *pure rhabarberic acid,* 7·5 *impure rhabarberic acid,* 2·5 *gallic acid,* 9·0 *tannin,* 3·5 *colouring extractive,* 11·0 *uncrystallizable sugar* with *tannin,* 4·0 *starch and pectic acid,* 14·4 *gummy extractive,* 4·0 *pectic acid,* 1·1 *malate and gallate of lime,* 1·1 *oxalate of lime,* 1·5 *sulphate of potassa and chloride of potassium,* 0·5 *phosphate of lime with oxide of iron,* 1·0 *silica,* 25·0 *lignin,* 2·0 *water* = 100·8. [1]

The following Tables show the effects of re-agents on the aqueous infusions of the two foreign varieties of rhubarb.

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[1] *Pharm. Central Blatt. fur* 1836, p. 482.

TABLE I. Precipitates formed by Acids, Alkalies, and Neutral Salts.

Variety of Rhubarb.	*Sulphuric Acid.*	*Nitric Acid.*	*Hydrochloric Acid.*	*Solution of Chlorine.*	*Solution of Potassa.*	*Solution of Carbonate of Potassa.*	*Lime-water.*	*Chloride of Barium.*	*Silicated Potassa.*
Russian.	copious, greenish yellow.	scanty, flocculent, pale yellow.	scanty, very slowly formed, yellow.	slowly formed, pale olive.	none, but strikes a deep lake colour.	none, but strikes reddish brown.	scanty, slowly formed, brown.	scanty, olive green.	none, but strikes a deep brown.
Chinese, or East Indian.	more copious, brownish yellow.	less scanty, pale yellow.	scanty, quickly formed, brownish yellow.	slowly formed, orange yellow.	none, a deeper lake.	none, but it is rendered turbid, and deep reddish brown.	copious, quickly formed, brown.	less scanty, orange yellow.	none, but strikes a deep brown.

TABLE II. Precipitates formed by Solutions of Metallic Salts.

Variety of Rhubarb.	*Solution of Sulphate of Iron.*	*Solution of Nitrate of Silver.*	*Solution of Nitrate of Mercury.*	*Solution of Nitrate of Lead.*	*Solution of Bichloride of Mercury.*	*Solution of Acetate of Lead.*	*Solution of Tartar Emetic.*
Russian.	copious, nearly black.	scanty, pale greenish yellow.	copious, olive yellow.	scanty, slowly formed, yellow.	scanty, slowly formed, pale olive.	scanty, greenish yellow.	scanty, slowly formed, white.
Chinese, or East Indian.	copious, deep olive green.	copious, orange yellow.	copious, heavy bright yellow.	scanty, slowly formed, deeper yellow.	copious, quickly formed, heavy yellow.	copious, yellow.	scanty, still more slowly formed.

When the residue, after the action of water, is digested in hydrochloric acid, and solution of ammonia added in excess to the solution, the liquid becomes of a deep purple colour, then somewhat milky, and slowly deposits oxalate of lime. What remains consists of woody matter, a small portion of albumen, and silex. Of the specimens which I examined, one drachm of Russian rhubarb yielded twenty-six grains of the oxalate, while the same weight of East Indian yielded eighteen grains: M. Henry procured only 30 per cent., and Schrader not more than 4·5 !

From the results of my experiments, rhubarb appears to contain a large portion of *extractive matter*, a very small portion of *resin, mucus, tannin,* or *gallic acid,* a *colouring matter,* much *oxalate of lime,* and minute proportions of *albumen* and *silex.*[1] According to the analysis of M. Henry, the Russian and Chinese rhubarb contain, of *resin* and *extractive,* R. 44. C. 39·35. + *gum,* R. 5·5. C. 6. + *starch,* R. 4·8. C. 12·86. + *albumen,* R. — C. 0·2. + *oxalate of lime,* R. 29·98. C. 32·8 + *lignin,* R. 10·62. C. 11·2. From this and other analyses no opinion can be formed of the active principle of rhubarb. What has been termed Rheine and Rhabarberin is merely the colouring principle of rhubarb. It is soluble in alkalies, which give it a beautiful violet-red colour. Alum throws down from this solution a fine lake.

The preceding tables show that the two varieties differ from each other in several respects. The Russian contains more *tannic acid, oxalate of lime*[2], and *resin* than the Chinese; the Chinese more *extractive* than the Russian. Besides these components, M. Henry found a *fixed oil* soluble in ether and alcohol, an *amylaceous matter, supermalate of lime, sulphate of lime,* and a *salt with a base of potassa.*[3] M M. Schlossberger and Döpping have more recently analyzed rhubarb, and find, beside the ordinary constituents mentioned in the analyses given above, at least three colouring principles, named *Phæoretin, Erythroretin,* and *Chrysophanic* acid, the two former uncrystallizable, and having properties intermediate between those of resin and extractive; the latter occurring when pure in the form of crystalline granules, soluble in alcohol, less so in ether, very little soluble in hot, and almost insoluble in cold water: the alkaline solutions have a beautiful red colour. It constitutes the greater part of the rhabarberin, rhabarberic acid, rheine, &c. mentioned in the various analyses of this

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[1] According to some experiments published by Mr. John Henderson, in the *Annals of Philosophy,* rhubarb is supposed to contain also a peculiar acid, to which he has given the name of *Rheumic:* but M. de Lassaignes has proved that this is the oxalic acid; which agrees with the result of our analysis.

[2] The oxalate of lime exists in the rhubarb in the form of minute aggregate crystals, *conglomerate raphides.* Mr. Quekett procured between 35 and 40 grains of these from 100 grains of rhubarb. — *Lindley's Introd. to Botany,* 3d edit. p. 553.

[3] *Journal. de Pharm.* tom. iv.

drug. The active principle of the rhubarb has not been separated by the analyses of these or any other chemists.

Medical properties and uses. — Rhubarb is stomachic and astringent or purgative, according to the extent of the dose in which it is administered: but in almost every instance its purgative effects are succeeded by an astringent; and constipation of the bowels follows. With a view to the first mentioned properties, it is usefully given combined with ginger, nutmeg, soda, or bitters, in dyspepsia, hypochondriasis, and a weakened, relaxed state of the bowels. In enlargement of the mesenteric glands in children, rhubarb is an excellent addition to *Hydrargyrum e cretâ.*

As a purgative it operates mildly, and may be given to the youngest infants. Its operation is quickened by the addition of neutral salts and calomel, the purgative powers of which it also reciprocally augments, so that a compound, formed of small portions of rhubarb and a neutral salt or calomel, acts with more certainty and quicker than large doses of either separately taken. Rhuharb is particularly adapted for the majority of cases of diarrhœa, as it evacuates any acrid matter that may be offending to the bowels before it acts as an astringent. In some persons it has been stated to cause convulsions, owing to a peculiar idiosyncrasy. Externally it has been applied by friction to produce its purgative effects[1], and its powder is sometimes sprinkled over ulcers to assist their granulation and healing.[2] It colours the urine in the space of twenty minutes after it is taken; and may be detected in it by the aid of an alkali. It disappears after an hour or two, but reappears, owing to a second absorption from the colon.[3] Bradner Staart also affirms that it can be detected in the urine after using a bath impregnated with it!

The Chinese use it medicinally; but they chiefly employ it to colour a spirituous liquor.

Rhubarb is given in a variety of forms (see *Preparations*), but its purgative properties are most powerful in powder, when only recently and coarsely powdered. From ℈ j. to ʒ ss. of the powdered root opens the bowels freely; and from grs. vi. to grs. x. may be given for a dose, when its stomachic properties only are required.

Officinal preparations.—*Infusum Rhei*, L. E. D. *Tinctura Rhei*, E. *Tinctura Rhei composita*, L. D. *Tinctura Rhei et Aloes*, E. *Tinctura Rhei et Gentianæ*, E. *Vinum Rhei*, E. D. *Extractum Rhei*, L. E. D. *Pilulæ Rhei*, E. *Pilulæ Rhei comp.* L. E. D. *Pilulæ Rhei et Ferri*, E. *Pulvis Rhei comp.*, E. D.

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[1] *Nouveaux Elém. de Thérapeut. par Alibert*, tome ii. p. 247.

[2] The Mongols have always used it as an astringent and antiseptic in wounds and ulcers both in man and in cattle.

[3] Such, at least, is the opinion of Sir E. Home.

RHÆAS. See *Papaver*.

RHUS.[1] *Spec. Plan. Wild.* i. 1479.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Anacardiaceæ.
G. 566. *Calyx* five-parted. *Petals* five. *Berry* with one seed.
** *With ternate leaves.*
Species 17. R. *Toxicodendron.* Poison Oak or Ivy. Sumach. *Kalm's Travels,* ii. 318. *Hayne,* ix. 1.

Syn. Toxicodendron, Herbe à la Puce (*F.*), Gift-sumach (*G.*), Vergiftboom (*Dutch*), Fergiftiga tradt (*Swed.*), Geltnik indovitoi (*Russ.*), Rus Tossicodendre (*I.*).

This shrub is a native of North America. It seldom exceeds three feet in height; the root sending up many stems, which divide into slender, woody branches, and are covered with a brownish bark. The leaves are placed alternately, supported on long petioles; and are composed of three oval leaflets, about three inches long, and one inch and a half broad, angularly indented, hoary on the under surface, and of a deep shining green colour on the upper: the two lateral leaflets are nearly sessile, and the terminal one is considerably the largest of the three: the male flowers, which are on a distinct plan from the female, spring from the sides of the stalks in close short spikes, and are of an herbaceous colour; the female, which are larger, are produced in loose panicles, and embosom a roundish germen, supporting three very short styles: the fruit is a striated berry.

The stems, if cut or broken, exude a milky juice, which was supposed to inflame the skin wherever it touched: but this is not the case, although the plant exudes a deleterious vapour[2], which in some persons causes itching, redness, and an erysipelatous inflammation of the face and exposed parts of the body: occasionally vesication supervenes. The juice becomes black when it is exposed for a short time to the action of the atmospheric air.[3]

Qualities.—The leaves of toxicodendron are inodorous, and have a mawkish subacrid taste. Their virtues are completely extracted by water, and partially by alcohol. The aqueous infusion reddens litmus paper; precipitates the solution of sulphate of iron black; that of nitrate of silver brown; and forms a precipitate with gelatin. Sumach leaves contain *gum, resin,* and *tannic acid,* also a *narcotico-acrid principle,* on which its effects chiefly depend.

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[1] Ῥοῦς Dioscoridis.

[2] Van Mons has proved that the acrimonious matter of the plant is exhaled during the night, combined with carburetted hydrogen gas. He collected a jar full of the gas, into which his brother, who was very susceptible of the poison of this species of rhus, plunging his arm, the skin was quickly inflamed and blistered.—*Actes de la Soc. de Méd de Bruxelles.*

[3] This juice forms an indelible black stain on linen cloth; and is used in Japan where the shrub is a native, as a varnish.—*Phil. Trans.* xlix. 158.

Medical properties and uses. — The leaves are stimulant and narcotic. In the hands of Dr. Alderson, of Hull, who introduced them as a remedy, they proved successful in several cases of paralysis, especially in paraplegia; and they have been found equally efficacious in the hands of M. Bretonneau, of Tours; but we believe their efficacy in this disease has not been confirmed by the observations of other English physicians. They excite a sense of heat and pricking, and irregular twitchings in the affected limbs. We believe some advantage has been found from their use in herpetic eruptions; but this has not been very satisfactory. They have also been found useful in the form of tincture, in cramp of the stomach.

The dose of the powdered leaves may be grs. v., given twice or thrice a day, and gradually increased to ℈j., or until some obvious effect is produced, in the form of a bolus.

RICINUS. *Spec. Plant. Willd.* iv. 564.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Euphorbiaceæ.
G. 1720. *Male. Calyx* five-parted. *Corolla* none. *Stamens* numerous.
——— *Female. Calyx* three-parted. *Corolla* none. *Styles* three, bifid. *Capsule* three-celled. *Seed* one.
* *With palmated leaves.*
Sp. 1. R. *communis.*[1] Common Ricinus, or Palma Christi. *Med. Bot. 3d edit.* 625. *t.* 221. *Rheede, Hort. Malab.* ii. 57. *t.* 32. *Hayne,* x. 48.
Officinal. RICINI OLEUM, *Lond. Edin. Dub.* The oil procured from the seed by heat or pressure, *L.* Expressed oil of the seeds of Ricinus communis, *E. D.* Castor oil.

Syn. (of seeds and oil.) La noix et l'huile du Ricin (*F.*), Rizinuskorner, Rizinusöhl (*G.*), I semi e l' olio di Ricino (*I.*), Aceyte de Ricino, Ricinsoel (*S.*), Aceyte de mamona (*Port.*), Purgeerkorn olie (*Dan.*), Kleshevinnae maslo (*Russ.*), Erundatylum (*San.*), Duhn ul Kyerooa (*Arab.*), Sittāmoonākaunnay (*Tam.*), Endooroo tail (*Cing.*), Rowgen Bedangeer (*Pers.*), Miniak jarak (*Malay*), Linga-jarak (*Jav.*), Oobali erundyka tel (*Beng.*).

This species of ricinus is an annual plant, a native of Greece[2], Asia, Hindostan, the East and West Indies, South America, and Africa.[3] It is also abundant on the rock of Gibraltar. It is of very quick growth, and sometimes attains to the height of sixteen feet.[4] The stem is round, thick, jointed, furrowed, glaucous in

[1] Κικι Dioscoridis; Kikiun of the Hebrew. Mr. G. Tradescant Lay asserts that it is the plant which screened the head of the prophet Jonah. — *Chinese Rep.* vol. v. p. 439.

[2] At Pamisus, in the Morea, where it grows in great abundance, it is called agra staphylia, or wild vine, from the resemblance of its leaves to those of the vine. — *Gell's Journ. in the Morea,* p. 193. In the Bosphorus it is called Kroton, from the resemblance of the seed to the tick insect which fastens on dogs' ears. — *Hort. Trans.* vol. vi.

[3] It was first cultivated in Britain in 1562. It thrives in the south of France.

[4] It has been asserted that this plant is in some places perennial, becoming a large tree. Wildenow, however, says, "Planta semper annua, nunquam fruticosa vel arborea, nec in calidissimis terræ plagis lignescit." — *Spec. Plant.* iv. 564.

the lower part, but of a purplish-red colour towards the top: the leaves are petiolate and subpeltate, large, deeply divided into seven pointed serrated lobes, and of a bluish-green colour: the calyx of the *male* flower is composed of five oval, pointed, purplish segments, enclosing many long stamens united at the base; the *female* is at the upper part of the spike, and is composed of a three-cleft reddish calyx: the styles are three, slender and forked at the apex: the capsule is a trilocular nut, covered with rough spines, and bursting elastically to expel the seeds; which are generally three, of an oblong flat figure, and of a black colour dotted with white.

The oil is obtained from the seeds both by boiling and expression. The former method was generally used till lately; and was performed by tying up the seeds, previously decorticated and bruised, in a bag, which was suspended in boiling water till all the oil was extracted, and rose to the surface of the water, when it was skimmed off. This mode of preparation is still preferred by many of the West Indian practitioners; but the oil is apt to get soon rancid when it is thus prepared. It is now obtained, both at home and abroad, by subjecting the seeds to the press, in the same manner as almonds to procure almond oil. The oil obtained by expression without heat is equal to one fourth of the weight of the seeds employed. The acrid principle is contained in the cotyledons, and in the embryon, but not in the testa or perispermal membrane. It is of a volatile nature.

Castor oil is sometimes adulterated with olive oil, linseed oil, and poppy oil, which, until recently, was proposed to be detected by adding an equal quantity of *alcohol* of sp. gr. ·820 to any given quantity of the suspected oil: if it be pure, it was stated that a uniform solution would take place, which was supposed not to happen when it was adulterated. It has, however, been found by Dr. Pereira, that this test cannot be altogether relied on, as castor oil has the property of rendering considerable quantities (33 per cent.) of other fixed oils soluble in alcohol: hence the Edinburgh test of the purity of castor oil, viz. that "it is entirely dissolved by its own volume of alcohol," is a fallacious one.

Qualities. — Good expressed or cold-drawn castor oil is nearly inodorous and insipid; but even the best leaves a slight sensation of acrimony in the throat after it is swallowed. It is thick, viscid, transparent, and either colourless or of a very pale straw-colour: that which is obtained by coction has a brownish hue; and both kinds, when they become rancid, thicken, deepen in colour to reddish-brown, and acquire a hot, very nauseous taste. Castor oil has all the chemical characters of the other expressed oils, except that it is heavier, and saponifies more readily with solutions of potassa or of soda. It is insoluble in water; but very soluble in alcohol, which takes up one third of its volume; and it is also

soluble in sulphuric ether. It is slowly converted into *palmine* by nitrous acid, and also by passing through it a stream of sulphurous acid gas. It combines with all other fixed and volatile oils.

It seems probable that castor oil consists of several neutral fatty principles, combined with a very small amount of an acrid principle, to which the purgative effects of the oil is chiefly due. It is supposed to consist of a fluid fat named *Ricinoleine*, and of another, solid at the ordinary temperature, which may be called *Ricino-stearine* or *Ricino-margarine*, or *Margaritine*.

Ricinoleine by saponification yields *ricinoleic acid* and glycerine, and when distilled with hydrate of potassa, is converted into sebacic acid, $C_{10} H_8 O_3 + H O$, which remains united with the alkali, at the same time that capryllic alcohol, $C_4 H_5 O + C_{16} H_{15} O_3$, distils over, and free hydrogen is evolved.

Formula for ricinoleic acid, $C_{38} H_{35} O_5$. *Ricino-stearic* or *margaritine* is contained in very small quantities in the oil. When saponified it yields glycerine and an acid, *ricino-stearic*, in white crystals, and which has a rather high fusing point.

East Indian castor oil resembles cold-drawn castor oil.

The *American* oil is very pure, and cold drawn: it deposits *margartine* in cold weather.

West Indian oil is of a deep colour; and, being prepared by heat, soon becomes rancid.[1] Mr. Brande says, that it sometimes undergoes such a change in the bowels that it passes off "in round and indurated nodules."[2] But such a circumstance has never come within my knowledge.

Medical properties and uses.—The seeds are drastic cathartics, but are scarcely ever ordered. The oil is mildly purgative, operating very quickly[3], and with so little irritation as to render it peculiarly fitted for cases in which the stimulating purgatives would prove hurtful; as in ileus, colica pictonum (in which it may be advantageously joined with henbane), calculous affections, piles, and after surgical operations in which the abdominal viscera are concerned. In dysentery, in which this oil is particularly indicated, the stomach will seldom retain it; but, when this is the case, it may be efficaciously exhibited per anum. It is also an excellent purgative for infants, even of the tenderest age, and for women in childbed. As as external application I have found it useful in *Lepra vulgaris*, when rubbed up with the ointment of nitrated mercury, in the proportion of one part of the oil to two parts of the ointment.

The dose is from f ʒ iv. to f ℥ jss., either floated on a little water

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[1] Rancid oil is easily purified by boiling it for fifteen minutes with water and a little calcined magnesia.—*Buchner.*

[2] *Manuel*, p. 150.

[3] The bark of the root of the tree is a powerful purgative.

and covered with a small quantity of any ardent spirit, or diffused in a cup of coffee; or in cinnamon or mint water, or camphor mixture, by means of mucilage of acacia gum, or the yolk of egg. The addition of some aromatic tincture is generally necessary to make this oil remain on the stomach.

ROCELLA. *Nat. Ord.* Lichenes.

Officinal. LACMUS, *L.* (*Appendix*), *E.* Litmus. A peculiar colouring matter from Rocella Tinctoria, *E.*

Syn. Orseille (*F.*), Lakmus flechte (*G.*), Orseille (*Swed., Dan.*), Oral (*Dutch*), Oricello (*I.*), Orcigla (*S.*), Orzella (*Port.*).

This is an indigenous lichen, found in Portland Island: but, as an article of commerce, it is obtained from the Levant; and also the Canary Islands[1], which produce annually 2600 quintals. It is a small species, seldom exceeding two inches in height. It is firmly fixed to the rocks by a solid base, from which rises a tuft of worm-like branching foliage, forming the *thallus.* Each division is round, acutely pointed, often curved, smooth, of a white grey or brownish hue, and studded about their upper part with scattered tubercles, or warts, replete with white powder. The *apothecia* are flat, almost black, and pruinose, with a slight prominent border.

From this lichen is prepared the Dutch *orchil,* or *archil,* of commerce.[2] It was known to the ancients, being the Λειχην of Dioscorides, and the *Phycos thalassion* of Pliny. Its use as a dye was, however, lost; till it was again accidentally discovered by a merchant of Florence, in 1300[3], observing that urine gave the lichen a fine violet colour. The preparation was long a secret, and was confined to Florence and Holland: but it is now known in England, and large manufactories of it are carried on in London and Liverpool. The lichen, after being dried and cleaned, is reduced to powder in a mill resembling an oil-mill.[4] It is then mixed in a vat with one half of its weight of pearl-ash, and moistened with human urine; fermentation soon succeeds, and is kept up by stirring, and by successive additions of urine, until the colour of the material changes, first to red, and then to blue. In this state it is mixed with a third of its weight of good potassa, and spread out to dry.[5] Chalk is sometimes added to it, but with no other

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[1] The ancients named the Canaries the Purple Isles, from the abundance of orchilla which they yielded. — *Mém de l'Acad. des Inscriptions,* tom. iv. p. 457. It forms the only article of vegetation on the northernmost of the Ilhas desertas, near Madeira.

[2] Litmus are also prepared from Luanera *tartaria,* in Holland; and from Variolaria *dealbata,* and V. *ercina* in France.

[3] *Thomson's Chymistry,* 4th ed. vol. v. p. 284. *Bancroft on Philosophy of Colours,* 2d edit. p. 292.

[4] Sometimes it is not ground, but prepared in the entire state.

[5] *Nicholson's Journal,* 4to. ii. 311.

view than to increase the weight.[1] It is generally sold in the form of small cubical cakes.

Qualities. — Prepared *archil* has a slight violet odour when it is mixed with orris-root, which is frequently the case. It has a mawkish taste, leaving some degree of pungency in the mouth. It communicates to water and to alcohol a beautiful violet-blue colour: all acids, and salts with an excess of acid, change it to red, which is again destroyed, and the blue restored by the addition of alkalies; and even exposure to the air of a room, in which many people are assembled, reddens the watery infusion. The tincture is least liable to change when kept, if it be reddened by an acid, and kept in close vessels. The Rocella Tinctoria contains *erythric acid, rocellic acid,* together with tannin, and other uncrystallized matters.

Erythric acid occurs in white crystals, soluble in alcohol and ether, and alkaline solutions, very sparingly so even in boiling water: resolved either by the action of heat and alkalies, or by destructive distillation into *Orcine.* The formula for the acid is $C_{34}\,H_{19}\,O_{15}$. *Rocellic acid* is a fatty crystallizable body, having for its formula $C_{24}\,H_{23}\,O_6$.

Use. — This species of lichen is said to have been "administered medicinally, with an intention of allaying the tickling cough attendant on phthisis, and in hysterial coughs[2];" but we must suppose the recent lichen is meant, or before it has undergone any preparation as a colouring matter. We know of no other use of the prepared lichen than as a dye-stuff, or as a chemical test of the presence of acids; and it is certainly the most delicate. See Pharmacopœia Appendix.

RODIÆI. NECTANDRA RODIÆI. Bibiri, or Greenheart Tree.

Class and Order. Dodecandria Monogynia. *Nat. ord.* Lauraceæ.

G. Nectandra. Leaves veiny. *Fertile stamens* nine, with four-celled subsessile anthers, of which the inner only are extorse. *Calyx* rotate.

Sp. Nectandra *Rodiæi.* Schomburgh. Bibiri, or Greenheart Tree. *Leaves* nearly opposite, oblong-elliptical, shortly acuminate, coriaceous, smooth, shining and obscurely netted on the upper side. *Panicles* few, flowered, axillary, much shorter than the leaves, finely downy. *Anthers* all thick, oblong, without glands. *Bentham.*[3]

The tree is large, often growing to the height of 60 feet or more. It is a native of British Guiana, growing on rocky hill

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[1] Archil is chiefly used by the dyers, and in times of scarcity it has been sold at 1000*l.* sterling the ton. It is often mixed with the Lichen *fuciformis.*

[2] *Translation of the Dublin Pharmacopœia.*

[3] *Medical and Economical Botany.* Lindley.

sides from 20 to 50 miles inland. The part which is used in this country is the bark of the trunk, which occurs in flat pieces, one or two feet in length, two or three inches broad, and about a quarter of an inch thick; very dense and heavy, of a dark brown colour, and covered with a brownish-grey epidermis: it breaks with a coarse fibrous fracture. The fruit is about the size of a small apple, containing a single seed. Both the bark and seeds contain at least one alkaloid, named *Bebeerine*, or *Bibirine*. A second body, named *Sipirine*, was thought at first to be a distinct alkaloid, but is now regarded as a product arising from some alteration in the *Bibirine*.

The Bebeerine or Bibirine is used chiefly in the state of a *sulphate*, or rather a *subsulphate*, procured by a process analogous to that employed in the extraction of Quina. It occurs in commerce in the form of yellowish-brown scales, which are yellow when powdered; soluble in alcohol, very slightly so in water, but rendered much more by the addition of a few drops of acid: the alkaloid is precipitated from its solution by ammonia. The commercial sulphate generally contains lime.

Pure *Bebeerine* has not yet been crystallized: it occurs as a whitish amorphous resinous body; soluble in alcohol and ether; very slightly so in water: its solutions are alkaline; it melts with heat, and is afterwards decomposed without being volatilized. According to Maclagan and Tilley, its composition is the same as that of Morphia ($C_{35}\ H_{20}\ N\ O_6$).

In Dr. Maclagan's analysis of the bark and seeds, besides the alkaloid, the following substances were found:—*tannic acid, resin, starch, sugar, gum, albumen, vegetable* fibre, and *salts*. The alkaloid (Bibirine and Sipirine) was contained in the proportion of about $1\frac{1}{2}$ per cent. in the bark, and $2\frac{1}{2}$ per cent. in the dry seeds.

Medical properties and uses.—Greenheart bark and its alkaloid appear to act in the same manner as Cinchona barks or Quina, namely, as tonic and antiperiodic. In small doses they appear to increase the appetite, and improve the digestive functions; in large doses they act as antiperiodics, arresting the progress of intermittent fevers and periodic diseases, as agues, hemicrania, and other forms of neuralgia. Their powers do not appear to be equal to that of bark or quina, but at the same time they have not as yet been known to induce the deafness and disturbance of the head which cinchona preparations frequently do; they have also the advantage of being much cheaper; and as the whole tree and fruit contain the alkaloid, it might be procured in very large quantities.

Dose of sulphate of bebeerine (the only preparation commonly employed) is from gr. j. to gr. iij., as a tonic; as an antiperiodic, gr. v. to gr. xx.

ROSA. *Spec. Plant. Willd.* ii. 1603.

Cl. 12. *Ord.* 5. Icosandria Polygynia. *Nat. ord.* Rosaceæ.
G. 997. *Petals* five. *Calyx* urceolate, five-cleft, fleshy, contracted at the neck. *Seeds* numerous, hispid, affixed to the inner side of the calyx.
** *With ovate germens.*
Species 15. R. *centifolia.* Hundred-leaved Rose. *Med. Bot. 3d edit.* 495. *t.* 178. *Hayne,* ii. 29.
Species 16. R. *gallica.* Red Rose. *Med. Bot. 3d edit.* 497. *t.* 179. *Hayne,* ii. 30.
Species 31. R. *canina.* Dog Rose, or Hep tree. *Med. Bot. 3d edit.* 493. *t.* 177. *Smith, Flora Brit.* ii. 540. *Gærtner,* i. 347. *t.* 73. *Hayne,* ii. 32.

1. Rosa centifolia.[1]

Officinal. Rosa centifolia, *Lond. Edin.* Rosæ Oleum, *Edin. Dub.* The Hundred-leaved Rose. The Damask, or Cabbage Rose. The fresh petals, *L. E.* Oil, or Attar, or Otto of Roses, *E. D.*

Syn. Pétales de Rose à cent feuilles (*F.*), Blumen der Blassen Rose (*G.*), Rosa de Alexandria (*S.*), Rozen (*Dutch*), Rosa (*Russ.*), Wurd (*Arab*), Gooläbupoo (*Tam.*), Tu Miuhoa (*Chin.*), Gul (*Pers.*), Mawar (*Malay*), Sewooanda mull (*Cing.*), Goolat (*H.*).

Although this species of rose is commonly cultivated in almost every garden in Europe, yet the place whence it was originally brought is still undetermined, notwithstanding the assertion of Herodotus that it grows wild in Macedon; and that of Loureiro that it is a native of China. Professor Ran has lately informed us that it is indigenous in Northern Persia.[2] The bush rises with prickly stems about three feet in height: the leaves consist of two or three pairs of leaflets, with a terminal one, attached on very short petioles to a rough common footstalk: the leaflets are ovate, rugose, of a deep-green colour on the upper surface, hairy on the under, and serrated, with purple edges, which are glandular. The flowers, which appear in June, are large, drooping into leafy bracts, supported on peduncles beset with brown bristly hairs. The segments of the calyx are semipinnatifid and viscid: the petals large, of a beautiful pale red or pink colour, fragrant, and very numerous. The fruit is oblong.

The varieties of this species of rose are very numerous; but for medicinal purposes they may be indiscriminately used; although Guibourt informs us that that variety of the Rosa *damascena,* called a *bifera,* which flowers in spring and autumn, is preferable to all the other varieties. The petals only are employed.

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[1] Ῥωδωνια Theophrasti.

[2] *Enumeratio Rosarum circa Wirceburgam,* 1816. Gerarde cultivated this species in 1596.

Qualities. — The odour of the petals is extremely fragrant, and their taste sweetish, subacidulous, subastringent, and at last slightly bitter. The petals of this variety of the rose contain *volatile oil*, a *fatty matter*, a *saccharine extractive*, *tannic acid*, *lignin*, and *some salts.* In distillation with water, a small portion of a butyraceous oil is obtained; and the water is strongly impregnated with the odour of the rose.

The *oil* or *attar* of *roses* is only made in India. It is distilled in a large copper or iron-tinned boiler, capable of holding from eight to twelve gallons: this has a narrow neck, spreading into a mouth about eight inches diameter, on which the head of the still is luted. The worm consists of two pieces of bamboo, fastened together at an acute angle, and covered with strong cord, and then with a luting of earth. The lower end of this tube is inserted into a receiver placed in water, which is often changed. After all the rose-water has distilled, it is placed in a large metal basin, covered with matted gauze, and placed in moist earth, where it is left all night. In the morning a thin film of attar forms on the surface, and is removed with a feather: this collection takes place daily until the whole is procured. The attar has at first a greenish hue, but it gradually becomes of a pale yellow.[1] It crystallizes under 84° Fahrenheit. It is sometimes almost colourless. Its odour is intense, penetrating, and diffusive. It is combustible, and forms an explosive mixture with oxygen. It is only sparingly soluble in alcohol; 1000 parts, sp. gr. 0·806, take up only 33 parts. According to Blanchet its formula is $C_{23}\,H_{23}\,O_3$; but this analysis requires confirmation. Attar of roses consists of a solid oil (*stearoptène*), and a liquid oil (*eleoptène*). It is said to be often adulterated with oil of sandal-wood, oil of rhodium, and the oil of Andropogon *Ivarhancusa*, and A. *Calamus aromaticus*, the grass oil of India; but Dr. Pereira says, that "the attar found in the shops of London is very pure."[2]

Medical properties and uses.— The petals of this species of rose are slightly laxative[3]; and as such are ordered, combined with sugar, in the form of a syrup, as an adjunct to olive oil and other purgatives in infantile diseases: but they are chiefly employed for the distillation of rose-water. The attar is used solely as a perfume.

Officinal preparations.—*Aqua Rosæ*, L. E. D. *Syrupus Rosæ*, L. E.

2. ROSA GALLICA.

Officinal. ROSA GALLICA, *Lond. Edin. Dub.* The Red or Provins Rose. Fresh and dried unexpanded petals of French Rose.

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[1] *O'Shaughnessy's Dispensatory.* [2] *Elements of Mat. Med.*

[3] Illustris mulier mihi asserebat, ex rosarum olfactu se fæcum alvinarum odorem percipere — *Plenck, Icones,* &c. cent. iv.

Syn. Fleurs de Roses rouges (*F.*), Essig-rose (*G.*), Fransche rosen (*Dutch*), Aettikerosor (*Swed.*), Caikerose (*Dan.*), Rosa kasnaia (*Russ.*), Rosa domestica (*I.*), Rosa rubra ó Castillara (*S.*), Rosa vermelha (*Port.*).

This species is a native of the south of Europe, cultivated in our gardens, and flowering in June and July. The stalks rise about three feet in height, are erect, and almost destitute of prickles. The foliage resembles that of the *centifolia;* but the leaflets are not so large, scarcely tomentose below, and subacute. The flowers also are less doubled; the petals large, widely spread open, of a deep, rich crimson colour, fragrant, and displaying an abundance of yellow anthers, on thread-like filaments; with the papillary stigmas of numerous, connected, villose styles, rising from the germen. The petals of the unblown buds are the parts medicinally used. They are cultivated in abundance in the neighbourhood of London for medicinal purposes.

Qualities. — The odour of this rose is less fragrant than that of the former species; but it is improved by drying: the taste is pleasantly bitter and austere. Water at 212° extracts both its odour and taste: and the infusion strikes a black with sulphate of iron, and also forms a precipitate of a dark colour with sulphate of zinc. According to Cartier, these unblown petals, freed from the claws, contain *volatile oil, colouring matter, tannin, gallic acid, fatty matter, albumen, soluble salts of potassa, calcareous salts, silica,* and *oxide of iron.*[1]

Medical properties and uses. — The red rose is astringent and tonic. It forms an elegant and useful vehicle for the exhibition of mineral acids, nitrate of potassa, and other neutral salts, in hæmorrhages, and many other diseases.

Officinal preparations.—*Confectio Rosæ,* L. D. *Conserva Rosæ,* E. *Infusum Rosæ compositum,* L. *Infusum Rosæ,* E. *Infusum Rosæ acidum,* D. *Mel Rosæ,* L. E. *Syrupus Rosæ Gallicæ,* E. D.

3. ROSA CANINA.[2]

Officinal. ROSA CANINA, *Lond.* ROSÆ FRUCTUS, *Edin.* The pulp of the Dog-rose fruit, or Hep.

Syn. Le fruit d'Eglantier de Chien (*F.*), Die frucht der wilden Rose Hagebutten (*G.*), Le polpa di fruti di Rosa canina (*I.*).

This species is a common but beautiful ornament of our hedgerows, flowering in June and July, and exhaling a very fragrant perfume. It rises to the height of eight or ten feet; has a smooth stem; with two alternate, compressed conical-hooked, bright red,

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[1] *Journ. de Pharm.* vii.

[2] Κυνοσϐατον Dioscoridis. *Handsrose* (G.), *Hondsroos* (Dutch), *Hybentorn* (Dan.), *Nieupon* (Swed.), *Rosa sylvestre* (S.), *Rosa brava* (Port.), *Schippownich* (Russ.), *Shora polna* (Pol.), *Gul* (Tartar), *Foo son* (Japan.).

internodial prickles; and elongated branches spreading from the upright. The leaves are pinnate, composed of seven ovate, pointed, inodorous leaflets, without glandular pubescence, naked and smooth on both sides, but the upper shining, and of a deeper green than the under. The petioles are pubescent, prickly and glandular. The floral peduncles generally form a kind of corymb; but are sometimes solitary and smooth. The calyx is composed of partly pinnated sepals; the petals are inversely cordate, generally five, of a pale flesh-colour, often white, and odorous. The fruit is an ovate, fleshy, smooth, red-berried calyx; with the apex sometimes open, sometimes shut; containing about thirty long angular achenia, embedded among white silky bristles.[1]

Qualities. — The fruit is inodorous, but has a pleasant, sweet, acidulous taste. According to Bitz, when deprived of the achenia and hair, its constituents are a trace of *volatile oil*, 0·065 of *fatty oil*, 0·05 *myricin;* of the scale, 1·419 *soft resin;* of the pulp, 0·463 *reddish-yellow hard resin*, 0·260 *tannin*, 30·6 *uncrystallizable sugar*, 25·0 *gum*, 4·552 *epidermis*, 14·0 *medullary fibre*, 2·95 *citric acid*, 12·865 *citrates*, *malates*, *water*, and loss.[2]

Medical properties and uses. — The pulpy part of heps is cooling, but possesses no direct medicinal properties. It is used only for the formation of the confection.[3]

Officinal preparations. — *Confectio Rosæ caninæ*, L. *Conserva Rosæ fructus*, E.

ROSMARINUS. *Spec. Plant. Willd.* i. 126.

Cl. 2. *Ord.* 1. Diandria Monogynia. *Nat. ord.* Labiatæ.

G. 62. *Corolla* unequal, with the upper lip two-parted. *Filaments* long, curved, simple, with a tooth.

Species 1. R. *officinalis.*[4] Officinal Rosemary. *Med. Bot. 3d edit.* 329. *Sibthorp, Flora Græca, t.* 14. *Hayne*, vii. 25.

Officinal. ROSMARINI OLEUM, *Lond.* ROSMARINUS, *Edin. Dub.* Oil of Rosemary. Rosemary tops.

Syn. Romarin (*F.*), Rosmarin (*G.*, *Dan.*, *Swed.*), Rosemarijn (*Dutch*), Rosmarin altetschnoi (*Russ.*), Romarino (*I.*), Romero (*S.*), Rosmaninho, Alecrim (*Port.*), Megren (*Scandin.*), Klil (*Arab.*), Yeng tsao (*Chinese*).

This plant is a native of the south of Europe, Greece, and Barbary; but has been long cultivated in Britain, where it flowers in April and May. It is an evergreen, erect, very branching shrub,

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[1] There are, according to De Candolle, nineteen varieties of Rosa *canina.*

[2] *Gmelin, Handb. de Chim.* ii. 1270.

[3] The confection is sometimes brought to table as a sweetmeat on the Continent; and the leaves of the plant are drunk by the Tartars and the Russians in Siberia instead of tea. The Russians of the Volga prepare a spirit from the flowers. — *Lin. Trans.* vol. xii. part i. p. 227.

[4] *Λιβανωτις* Dioscoridis.

rising about four feet in height; the branches thickly covered with leaves, and the smaller ones four-cornered and downy. The leaves are opposite, almost sessile; more than an inch in length, and one sixth of an inch broad; linear, obtuse, entire, revolute at the edge; of a dark-green colour, smooth, and shining, on the upper side; woolly, veined, and of a silvery hue on the under. The flowers, which are placed on small axillary, opposite, leafy branches, are axillary and terminal, erect, subsessile. The calyx is bell-shaped, bilabiate, villous; the upper lip entire; the under cloven into two pointed segments. The corolla is ringent, downy, pale blue, variegated with purple and white; the tube longer than the calyx, a little compressed; the upper lip erect and bifid; the lower cleft into three segments; the middle one larger, concave, and notched. The stamens are longer than the upper lip, arched, furnished with a tooth above the base; and supporting an oblong, blue, terminal anther. The style is the length of the stamens, thread-like, arched, and terminated by a simple sharp stigma.[1]

Qualities.—Both the leaves and flowers have a grateful aromatic odour, and a bitterish, warm, pungent taste, depending on a *volatile oil.* Vide *Ol. Rosmarini.* Alcohol extracts its virtues completely; but they are only partially given out to water. By distillation with water, the volatile oil is obtained. The tops afford the greatest quantity; the flowers the smallest. The tops contain also *tannic acid* and *bitter extractive.*

Medical properties and uses.—Rosemary is stimulant, and, according to some, emmenagogue.[2] It has been given in the form of infusion in nervous headache, hysteria, and chlorosis; but it is now scarcely ever prescribed, unless as an odorous adjunct to sternutatory powders. The dose in substance may be from grs. x. to ℈ij.; and from ℥j. to ℥jss. of the infusion.

Officinal preparations.—*Oleum Rosmarini,* E. D. *Spiritus Rosmarini,* L. E. *Essentia Rosmarini,* D.

RUBIA. *Spec. Plant. Willd.* i. 603.

Cl. 1. *Ord.* 1. Tetrandria Monogynia. *Nat. ord.* Rubiaceæ or Stellatæ.
G. 187. *Corolla* of one petal, bell-shaped. *Berries* two, one-seeded.
Species 1. R. *tinctorum.*[3] Dyers' Madder. *Med. Bot. 3d edit.* 173. *t.* 67. *Hayne,* xi. 4.

RUBIA TINCTORUM. Dyers' Madder.

Syn. Garance (*F.*), Krappwurzel, Färberothe (*G.*), Mee krap (*Dutch*), Krap (*Dan., Swed.*), Mariona (*Russ.*), Radiche di Robbia o Garanza (*I.*), Rubia (*S.*), Ruida (*Port.*), Munjith (*H.*), Fuh (*Arab.*), Runas (*Pers*), Manjttittie (*Tam.*), Marzana (*Pol.*), Kermesa Buja (*Turk.*).

This plant is a perennial, with annual stems. It is a native of

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[1] The Spanish peasantry wear twigs of Rosemary in their hats as a charm against witchcraft.—Barrow's *Bible in Spain.*

[2] *Bergius, Mat. Med. à Regno Veget.* p. 21.

[3] Ερευθοδανον Dioscoridis.

the south of Europe, the Levant, and Africa, and has been cultivated to a very great extent for upwards of 300 years in Zealand: it flowers in June.[1] The root is composed of many long, thick, succulent, reddish-brown fibres, about the thickness of a man's finger, united at the top in a rhizome, from which go off many side-roots, extending under the surface of the ground, and throwing up shoots by which the plant may be propagated. The stems are tetragonal, jointed, procumbent, and furnished with rough, short, hooked prickles, by which they are supported on the neighbouring plants. The leaves, which are in whorls of four or five, are elliptical, pointed, rough, and ciliated, about three inches long, nearly one broad in the middle, and having the midribs armed with the same kind of prickles as on the stems. The branches bearing the flowers spring from the joints of the stems. The flowers are small, terminal, with a campanulate, yellow corolla, cut into four oval segments; the filaments are short, supporting simple erect anthers; and the germen is inferior and double, crowned with a slender style bearing two globular stigmas, and becoming two round black berries.

In Holland, madder root is dug up for use in the third summer of its growth. It is then dried gradually in a stove built in the form of a tower, containing several floors; and from the uppermost it is progressively removed to the lowest; after which it is threshed to remove the cuticle, and the drying completed in a kiln. When perfectly dried it is pounded, and finally packed in barrels for the market. There are three descriptions of this powder. The first pounding separates and reduces to a powder the fibrillæ and the skins of the larger roots only, which is sold at a low price under the name of *mull;* a second pounding separates one third of the remaining parts of the large roots, which is sold under the name of *gamene;* and a third pounding forms into a powder the pure bright residue of the roots, which is the best, and is simply called *crop* madder.[2] In the Levant the root is termed *Alizari.* It is imported whole.

Qualities. — Madder has an unpleasant but not strong odour; and a bitter, slightly austere taste. It attracts the moisture of a damp atmosphere, and is injured by it. To water, alcohol, and volatile oils, at a temperature of 60°, it imparts a red colour; but to water at 212° the colour imparted has a deep tinge of brown.

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[1] As madder is an article of great national importance as a dye-stuff, many attempts have been made to cultivate it in this country, but without success, the Dutch madder being both better and cheaper than ours. That it can be grown to great perfection in this country is certain, and the effort to introduce its culture should not be dropped. The best comes from Zealand; to which Britain alone is said to have paid 200,000*l.* annually for madder. — *Bancroft on Permanent Colours*, 2d edit. vol. ii. p. 222.

[2] *Bancroft*, l. c.

Its principal constituent is *extractive*, which is precipitated, by a solution of alum, brownish red; by the alkaline carbonates and lime-water, blood-red or lake; and by acetate of lead, brown.[1] The taste and odour of the madder are imparted to water, ether, and alcohol by infusion. The colouring principles of madder are various; one of them is peculiar. When the madder is digested in ether and evaporated, it has a brown hue, and when sublimed in a gentle heat, it condenses in small, red, acicular, diaphanous, flexible crystals, which are insipid and inodorous, and give to boiling water a rose-red colour. They are also soluble in 210 parts of alcohol, and 160 of ether, at 60° Fahr.: they neutralize alkaline leys, to which they impart a violet colour. Robiquet and Colin have named the madder red, procured by sublimation, *alizarin*[2]: it is in orange crystals, and has the formula $C_{14}\,H_5\,O_4 + 3\,H\,O$. According to Bucholz, madder contains 1·2 of *resinous red colouring matter*, 39·0 *extractive*, 1·9 *reddish-brown matter soluble in potassa and alcohol*, 0·6 *pungent extractive*, 9·0 *gummy matter*, 22·5 *lignin*, 4·6 *matter soluble in potassa*, 1·8 *salts of lime* and *colouring matter*, 12·0 *water*, 7·4 loss, = 100.[3]

Medical properties and uses. — Madder is usually regarded as emmenagogue, and was formerly much relied on in chlorosis, and scanty and difficult menstruation. It has also been recommended in jaundice, and the atrophy of infants: but its efficacy in any disease is extremely problematical. Its colouring matter, however, is carried into the circulation, tinges the urine and the milk a blood-red colour, and is deposited in the bones.[4]

The dose of madder may be from ʒ ss. to ʒ ij., united with sulphate of potassa, and given three of four times a day.

It was officinal in the Dublin Pharmacopœia, 1826.

RUMEX. *Spec. Plant. Willd.* ii. 249.

Cl. 6. *Ord.* 2. Hexandria Digynia. *Nat. ord.* Polygonaceæ.

G. 699. *Calyx* three-leaved. *Petals* three, converging. *Seed* one, three-sided.

** *Hermaphrodites: with naked valves, or not marked with a grain.*

Species 18. R. *aquaticus.* Great Water-dock. *Smith, Flora Brit.* 394. *Med. Bot. 3d edit. t.* 299. *Hayne,* xiii. 4.

*** *With deciduous flowers.*

Species 31 R. *Acetosa.* Common Sorrel. *Med. Bot. 3d edit. t.* 230 *Smith, Flora Brit.* 396. *Hayne,* xiii. 6.

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[1] *Annales de Chimie,* iv. 104.

[2] From *Alizuri,* the name given to madder in the Levant.

[3] *Gmelin, Handb. de Chim.* ii. 1270.

[4] Vide *Phil. Trans.* xxxix. 287—299. The leaves of the plant are said to tinge the milk of cows reddish, when eaten by them.

1. RUMEX AQUATICUS.[1] Great Water-dock.

Syn. La Patience aquatique (*F.*), Wasser Ampfer (*G.*), Waterpatich (*Dutch*), Rabaca major (*Port.*), Wodanoi Schawel (*Russ.*), Kong-ŏ-lĭk (*Esquimaux*).

Water-dock is an indigenous, perennial plant, growing in ditches and on the banks of rivers; flowering in July and August. The root is thick. The stem rises about five feet in height, straight, furrowed, and smooth. The leaves are almost glaucous, lanceolate, and pointed, and the lower ones obcordate at the base. The flowers are in approximate whorls. They are nodding, on capillary pedicels, thickened at the apex. The valves are large, ovate, veined, entire, sometimes a little toothed, and all marked with a small, linear, often obscure tubercle: the seed is large.

Qualities.—The root is nearly inodorous, and has a very austere taste. It yields its virtues to water.

Medical properties and uses.—Water-dock root is powerfully astringent. It was formerly celebrated, under the name *Herba Britannica*, as a remedy for scurvy, and some cutaneous affections. It is now scarcely ever employed, although it undoubtedly possesses considerable powers in scurvy. Linnæus, in a letter to Dr. Lind, describing the scurvy of the Laplanders, asserts, that it is the only remedy which proved efficacious in that disease when "the ulcers are healed, and the patient is attacked with asthma."[2] I have ascertained that a decoction of one ounce of the sliced root of the common dock, Rumex *obtusifolius*, in a pint of water, is extremely efficacious in obstinate ichthyosis. In a full dose, about two ounces of the decoction, it purges freely; but at the same time improves the tone of the stomach.

2. RUMEX ACETOSA. Common Sorrel.

Syn. Oseille ordinaire (*F.*), Sauerampfer (*G.*), Veldzuuring (*Dut.*, *Belg.*), Engsyre (*Dan.*), Angsyra (*Swed.*). Szszaw (*Polish*), Konnevoi schavel (*Russ.*), Acetosa (*I.*), Azedera (*S.*), Azedas (*Port.*).

This is an indigenous perennial plant, common in pastures, and flowering in June. The stem is round, striated, and leafy, and rises from one to two feet in height. The leaves are oblong, ovate, and arrow-shaped; the radical ones petiolate and obtuse; and those of the stem sessile, amplexicaule, pointed, and a little rolled back. The flowers are diœcious, in branched panicles, and arranged in half whorls; the calyx and corolla are small; the stamens very short, bearing large yellow anthers, and the styles short, with large, crimson, bearded stigmas. The valves are ovate, entire, and graniferous, or bearing an oblong pale tubercle.

Qualities.—Sorrel leaves are inodorons, and have a grateful, austere, acidulous taste, depending on the presence of *binoxalate of potassa*, *tartaric acid*, and *tannic acid*, which they contain.

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[1] Βρεταννικη η βεττονικη Dioscoridis.

[2] *Correspondence of Linnæus*, vol. ii. p. 476.

Medical properties and uses. — These leaves are refrigerant and diuretic. Their expressed juice diluted with water, or a decoction of them in whey, affords a drink in cases of inflammatory fever; and eating them in large quantities daily as a salad may prove serviceable in some cutaneous affections. In France, the plant is cultivated for the use of the table; and Dr. Clarke mentions that the natives of *Wermeland*, on the confines of Sweden, make it into bread in seasons of scarcity, and that it is not unsalutary.[1]

RUTA. *Spec. Plant. Willd.* ii. 542.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Rutaceæ.
G. 827. *Calyx* five-parted. *Petals* concave. *Receptacle* surrounded by ten melliferous points. *Capsule* lobed.
Species 1. R. *graveolens.*[2] Common Rue. *Med. Bot. 3d edit.* 437. *t.* 174. *Hayne*, vi. 8.
Officinal. RUTA, *Lond. Edin.* The leaves and herbaceous part of Rue. RUTA OLEUM, *Lond.* Oil of Rue.

Syn. Rue sauvage (*F.*), Raute, Gartenraute (*G.*), Ruite (*Dutch*), Rude (*Dan.*), Winruta (*Swed.*), Ruda (*Russ.*), Ruta (*I.*), Ruta de derpesado (*S.*), Arruda (*Port.*), Arooda (*Tam.*, *Cing.*), Sadsah (*Malay*), Sendib (*Arab.*), Saturee (*H.*), Inghoo (*Javanese*).

Rue is an evergreen perennial, a native of the South of Europe, but much cultivated in our gardens, flowering from June till September. It rises to the height of two or three feet, is shrubby and branching, with the lower part of the stems ligneous, and covered with a rough, striated, grey bark; but the upper branches are smooth, and of a pale-green colour. The lower leaves are supradecompound; and the leaflets obovate, sessile, decurrent, and very obscurely crenate, with the terminal one generally notched; the surface dotted, the texture rather thick, and the colour bluish-green or glaucous: the uppermost leaves are simply pinnate. The flowers are produced in terminal branched corymbs on subdividing peduncles. The flower which opens first has a five-parted calyx, and a five-petalled corolla; but the others have the calyx four-parted only, and a four-petalled corolla. The petals are concave, wrinkled at the edge, of a pale greenish-yellow colour, and very much spread: the stamens are awl-shaped, the length of the petals, and bearing small, yellow quadrangular anthers.[3] The germen is large, oval, punctured, deep-green, with crucial furrows, and

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[1] *Travels &c.*, part iii. p. 90. 4to. Lond. 1823.
[2] Ῥυτη Πηγανον Dioscoridis.
[3] These stamens display in a striking manner the spontaneous motions which take place in some plants. They are very stiff, and cannot be disturbed from the posture in which they happen to be; but nevertheless they rise by a spontaneous movement, one or two at a time, and lean over the stigma till the pollen be shed, when they fall back again, and give place to others.

crowned with a short style and simple stigma: the seeds are angular, rough, and blackish.

Qualities. — Rue leaves have a powerful unpleasant odour, and a hot, bitter, nauseous taste. In the recent state, the leaves possess so much acrimony as to inflame and blister the skin; but much of this is dissipated in drying.[1] In distillation with water, they yield a pungent volatile oil, on which their virtues chiefly depend; consequently, decoction is a bad form of preparation of rue. According to Mühl, rue contains *volatile oil, bitter extractive, chlorophylle, a peculiar vegeto-animal matter, mallic acid, gum, albumen, starch,* and *lignin.*[1]

Medical properties and uses. — Rue is stimulant and antispasmodic, and is supposed to possess emmenagogue powers. In large doses it seems to produce acro-narcotic effects. It was in high estimation so early as the time of Hippocrates, who frequently ordered it in female complaints.[3] In modern practice it is chiefly used in hysteria and flatulent colic. I have found a strong infusion of it, exhibited per anum, of great service in relieving the convulsions of infants, arising from flatulence and other intestinal irritations. It may, however, inflame the mucous coat of the intestines, and therefore should be used with caution. The dose of the powdered leaves is from ℈ j. to ʒ ss., given twice or three times a day.

Officinal preparations. — *Oleum Rutæ,* E. *Confectio Rutæ,* L.

RUTÆ OLEUM. *Lond.* See Part III.

SABADILLA. See *Helonias officinalis.*

SABINÆ OLEUM. See *Juniperus.*

SACCHARUM. *Spec. Plant. Willd.* i. 122.

Cl. 3. *Ord.* 2. Triandria Digynia. *Nat. ord.* Graminaceæ.

G. 122. *Calyx* two-valved, involucred, with a long lanugo. *Corolla* two-valved.

Species 4. S. *officinarum.*[4] Common Sugar-cane. *Sloane's Jamaica,* i. 101. *t.* 66. *Phil. Trans.* lxix. 207—278. *t.* 3. *Hayne,* xi. 30, 31.

Officinal. SACCHARI FÆX. SACCHARUM, *Lond.* SACCHARI FÆX; SACCHARUM COMMUNE; SACCHARUM PURUM, *Edin.* SACCHARUM OFFICINARUM; SACCHARUM PURIFICATUM, *Dub.* Molasses. Treacle. Unrefined Sugar. Refined Sugar. White Sugar.

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[1] 100 lbs. of leaves yield by drying about 22 lbs.

[2] *Pfaff, Mat. Med.* iv. 339.

[3] *De Morbis Mulier.*

[4] Cannamelle (*F.*), Zuckerrohr (*G.*), Suikerriet (*Dutch*), Cannamele (*I.*), Cana de azucar (*S.*), Quasab (*Arab.*), Can che (*Chin.*).

Syn. Sucre, Sucre-pur (*F.*), Zucker, Weisser Zucker (*G.*), Suiker (*Dutch*), Sukker (*Dan.*), Socker (*Swed.*), Sachar (*Russ.*), Zucchero brutto, Zucchero in pane, Melassa (*I.*), Azucar, Atriaca (*S.*), Assucar (*Port.*), Shukhir (*Arab.*), Chenee (*H.*), Sakkari (*San.*), Sakkarei (*Tam.*), Shukker (*Pers.*), Soola (*Malay*).

The common sugar-cane, Saccharum *officinarum*, is cultivated in both the East and West Indies; but its native country is unknown. It is also cultivated in Persia. There are two varieties of the officinal sugar-canes: the *Creole* and the *Tahiti.* They are distinguished chiefly by the colour of the leaves; those of the former being much deeper than those of the latter. The rhizome is jointed, and sends up several solid jointed purple or yellow stems, which rise in general to the height of eight to twelve feet. A flat leaf springs from each joint, and the base of it embraces the stem to the next joint above its insertion, before it expands. From this point each leaf is about three or four feet long, and comparatively narrow, like a blade of grass; with the midrib broad and prominent on the under side, and the edges thin and sharply toothed. The flowers are whitish, in terminal panicles, two or three feet in length, and composed of subdivided spikes, with long flexuose loose hairs or lanugo, which enclose the flowers and hide them from the sight. The rachis is striated; the glumes are smooth: palea smooth, membranous, pink. The seed is oblong, pointed, and ripens in the valves of the flowers.

Although the sugar-cane has been long cultivated on the American continent and its islands, yet the culture of it, and the art of making sugar, were carried from Spain to the Canary Islands[1], and thence extended, about the end of the fifteenth century, to the West Indies and the Brazils; the former of which supplies the greater part of the consumption of Europe[2], a small proportion only being brought from the East Indies. The quantity of sugar yielded by the plant is varied by climate: thus, the Tahiti cane contains one-third more crystallizable sugar than the cane of any other place.[3] The average quantity is from six to fifteen per cent. There are many varieties of the cane, besides those already mentioned. Sugar is also made in large quantities from the root of the beet, Beta *vulgaris;* the *sugar maple,* Acer *saccharinum;* the *cocoa-nut palm,* Cocoa *nucifera;* and the *sweet sorgho,* Sorghum *saccharatum.*

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[1] At one time sugar was the staple commodity of Madeira, although there is now one sugar mill only on the island; but the sugar is uncommonly fine, and has an agreeable odour, not unlike that of violets. Sprengel says, the first notice of the sugar-cane is found in the Itinerary of Abusaida, in which it is stated that it grows at Siraf; and Abulfed says it grows spontaneously at Almansura, in India. Ebu Alvan first described the mode of collecting and preparing the juice.

[2] The average importation into England and Scotland, between 1787 and 1790, amounted annually to 1,952,262 cwt. — *Mosley's Hist. of Sugar*, p. 154.

[3] The Batavian, which is less productive, is undoubtedly a distinct species. The foliage is purple, and very broad.

In the West Indies the sugar-cane is propagated by cuttings of the stalk taken from near its top, and laid horizontally in the ground. It requires a rich permeable soil; and from fourteen to seventeen months before it ripens: good land will furnish five crops of shoots, without transplanting. The canes are cut for the purpose of making sugar between the sixth and thirteenth months of their growth, when the stems have acquired from seven to ten feet in height, a proportionable size, and the cuticle appears smooth, dry, and brittle. This generally happens in the months of February, March, and April. As soon as they are cut, the canes are stripped of their leaves, and immediately crushed between iron rollers, to express the juice, which has an olive green colour, and a balsamic odour. Its sp. gr. is 1·103; and its chief contents are *sugar, gum, fecula, extractive, gluten, acidulous acetates,* and *malates* and *sulphate of lime.* The juice is received into large leaden vessels, called *receivers,* whence it is conveyed into a copper vessel, named the *clarifier,* where it is mixed with lime, in the proportion of one pint to 100 gallons of juice, and heated to the temperature of 140°.[1] A thick scum soon forms on the top, from under which the clear liquor is drawn off by a cock into a large copper boiler, where it is boiled till the bulk of the liquor is very considerably diminished. The boiling is successively repeated in four other coppers, progressively smaller; and from the last, which is called the *teache,* it is conveyed into shallow wooden coolers, where it grains, and the concreted mass separates from the uncrystallizable matter, or molasses. This mass is then put into empty hogsheads, having holes in the bottom, through each of which the stalk of a plantain leaf is thrust; and, when the molasses has drained off, the process is finished. In this state the sugar is brought home, under the name of *raw* or *muscovado* sugar. In Europe, however, sugar undergoes another process for its purification. It is coarsely ground, dissolved in lime-water, and clarified with bullocks' blood; then boiled down to a proper consistence, the impurities being skimmed off as they rise, and the syrup filtered through coarse-grained animal charcoal; it is next boiled in a copper vessel by the aid of steam under a diminished pressure of the atmosphere, to a certain consistence, after which it is transferred to conical earthen vessels, where it is left to granulate. The point of the cone is perforated, and the base covered with moist clay, the fluid in which percolates the sugar, and runs off through the perforated apex, which is placed undermost, carrying with it any uncrystallized impure syrup. In this state it is called

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[1] The lime extricates carbonic acid from the juice, and forms, with the *herbaceous* or feculent matter, an insoluble compound, which rises to the surface, and forms the scum.

loaf sugar; and requires a second purification before it is considered as completely *refined* sugar. The new method of purification, which was introduced by Messrs. Taylor and Howard, consists in boiling the sugar with steam, at a low temperature, as above stated, in close pans, over which a vacuum is formed by the air-pump.

A new process for purifying sugar has been proposed by Dr. Scoffern: it consists in removing impurities by means of subacetate of lead, and afterwards depriving the liquor of excess of lead by passing a stream of sulphurous acid gas through the mixture, by which means an insoluble sulphite of lead is formed. A *small* portion of lead remains with the sugar, which may produce very injurious consequences when taken into the system for a lengthened period.

Sugar was originally brought from Asia, about the period of the Crusades, but was for a long time only employed as a medicine.

Qualities.—*Raw* or *muscovado* sugar is odorous, and sweet to the taste. It is in concreted masses, consisting of small, dry, sparkling, irregular crystals of a yellowish-brown colour. It has the odour of honey; and, beside *pure cane sugar,* contains *colouring matter, lime,* and *malic acid. Refined sugar* is inodorous, and sweet to the taste. Its colour is pure white; and the mass or loaf, in which it is concreted in small cohering crystals, should be hard, extremely brittle, pulverulent, and persistent in the air: the crystals are modified, oblique, rhombic prisms. Cane sugar requires only one third of its own weight of water at 60° for its solution: when united at a higher temperature with a smaller quantity of water, it remains dissolved, forming *syrup.* Sugar is sparingly soluble in cold alcohol: it requires four parts of boiling spirit of wine, of sp. gr. 0·880, for its solution; and by rest a moiety of the sugar again separates in crystals. Volatile oils also readily combine with it, and form *oleo-sacchara,* which are miscible with water. Lime and the fixed alkalies unite with sugar, and form compounds without any sweetness of taste. The concentrated strong acids act differently upon sugar. The sulphuric acts violently upon it, sulphurous acid being disengaged, and the sugar carbonized; nitric acid converts it into oxalic acid. By the action of dilute sulphuric acid, cane sugar is converted into grape sugar; and by the action of alkalies cane sugar is changed first into grape sugar before it undergoes further changes. Cane sugar, when boiled with a caustic alkali and oxide of copper, *very* slowly reduces the metal to the state of the red suboxide; whereas by grape sugar this change is instantly effected: hence these two kinds of sugar are readily distinguished from each other. The alkaline and earthy hydrosulphurets, sulphurets, and phosphorets decom-

pose it, and resolve it into a substance resembling gum.[1] The formula of anhydrous cane sugar is $C_{24}\ H_{18}\ O_{18}$.

Molasses has a peculiar odour, and a sweet, empyreumatic taste. It is of a brown or black colour, thick, and viscid; and is constituted chiefly of the uncrystallizable part of the juice of the sugar-cane, which Prout has denominated liquid sugar, combined with saline, acid, and other vegetable matters. It is more soluble in alcohol than sugar.[2]

Medical properties and uses.—Raw sugar and molasses are laxative; and refined sugar externally applied is escharotic. All the kinds are extremely nutrient when eaten along with other food; and they are more generally used as articles of diet than for medicinal purposes; except it be to cover the taste of nauseous drugs. Sugar is useful in preventing chemical changes from taking place in the solutions of the iodide of iron, iodide of zinc, carbonate of iron, and protoxide of iron. In a therapeutical point of view, sugar is said to be a preventive of worms, and to prove useful in scurvy; but it is hurtful to those of bilious, hypochondriacal, and dyspeptic habits. Milk boiled with fine sugar will keep good for a considerable time. It is said to be an antidote to the poison of verdigris; but as it does not decompose the salts of copper under such conditions, it cannot be regarded as an antidote of cupreous poisons. It is well adapted for preserving animal and vegetable matter.

Officinal.—*Syrupus*, L. *Sirupus Simplex*, E. D. Sugar is contained in all syrups, Trochisi, and confections, and in the *Ferri Carbonas cum Saccharo*, L. E. D. Treacle forms an ingredient of many pill masses, *L.*

SACCHARUM LACTIS, *Dub.* Sugar of Milk. Lactine.

This sugar has recently been made officinal by the Dublin College. It is prepared very largely in Switzerland, where it is employed as an article of food. It is very readily made from milk by the following process:—An acid is first added to coagulate the caseine; the fluid is then filtered, evaporated to a thin syrup, and set aside. The milk-sugar slowly crystallizes out, and may be purified by animal charcoal and re-crystallization.

Qualities.—When pure it occurs in the form of four-sided prisms, which are white, translucent, and very hard. It is frequently found in cylindrical masses, the crystals having been deposited on cords or sticks. It is sweetish to the taste, but much less so than either cane or grape sugar. It is soluble in about six

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[1] *Rollo on Diabetes*, 452. *Thomson's Chemistry*, 4th edit. vol. iv. 660.

[2] A sugar in every respect resembling common sugar is obtained from the maple, the roots of the beet, carrots, the roots of marshmallows, and many other plants.

parts of cold and two of boiling water; insoluble in alcohol or ether. It does not itself undergoe the vinous fermentation, but by the action of dilute acids it is converted into grape-sugar; and hence sour milk can be made to yield, by fermentation, a spirituous liquor. It can also be converted into lactic or butyric acid by the action of caseine and albuminous matters. By the action of nitric acid it is converted into oxalic and mucic acids. Formula $C_{24}H_{24}O_{24}$. It loses water by heat, and when anhydrous its formula is $C_{24}H_{19}O_{19}$.

About 5 per cent. of lactine is said by Boussingault to be present in milk.

Medical properties and uses. — Lactine does not appear to have any medicinal action: it can be employed as a vehicle for more active medicines, either as a powder or pill. It is a favourite remedy among the so-called Homœopathists.

SAGAPENUM, *Lond.* Sagapenum: the Gum resin of an uncertain plant.

Syn. Sagapenum (*F.*), Sagapengummi (*G.*), Sagapeno (*I.*), Sagapeno (*S.*), Sugbeenuj (*Arab.*), Kundel (*H. Sans.*).

This gum resin, which is brought to this country from Smyrna, Aleppo, and Alexandria, is the concrete juice of an unknown Persian plant. Dioscorides mentioned it as the juice of a ferula growing in Media[1]; and nothing more is known of its source at this day; although Willdenow supposes it to be the *Ferula Persica.*[2]

Qualities. — Sagapenum has an alliaceous odour, and a hot, acrid, bitterish taste, not unlike that of assafœtida, only weaker. It is in agglutinated masses, of an olive or brownish yellow colour, slightly translucent, and breaking with a horny fracture. It softens, and is tenacious between the fingers; melts at a low heat, and burns with a crackling noise and white flame, giving out abundance of smoke, and leaving behind a light spongy charcoal. Water and strong alcohol dissolve it partially; but it is almost completely soluble in proof spirit. In distillation with water it yields a little garlic-smelling volatile oil, which impregnates the water strongly with its flavour. Its constituents, according to Brandes, are 37·2 of *gum*, 50·3 of *resin*, 0·40 *acidulous malate of lime*, 3·7 of *volatile oil.*

Medical properties and uses. — This gum-resin is antispasmodic and emmenagogue; and externally discutient. It is sometimes employed in hysteria and chlorosis, and other cases in which assa-

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[1] *Dioscorides,* lib. iii. c. 95. (Σαγαπηνον).

[2] This plant was fully described by Dr. Hope, as the plant which yields the assafœtida, which, however, is the produce of another species. See *Phil. Trans.* lxxv. 36. t. 3, 4.

fœtida has been found serviceable; but it is much inferior in its powers to that gum-resin. It is usually given in substance, in doses of from grs. vj. to grs. xij., made into pills.

Officinal preparation.—*Sagapenum preparatum*, L. Sagapenum forms an ingredient of Pilula Galbani composita, *L.* Confectio Rutæ, *L.*

SAGUS. *Spec. Plant. Willd.* viii. 403.

Cl. 21. *Ord.* 6. Monœcia Hexandria. *Nat. ord.* Palmaceæ.
G. 1683. *Spathe* universal, univalve. *Spadix* ramose.
Male. *Calyx* triphyllus. *Corolla* O. *Filaments* dilated.
Female. *Calyx* triphyllus, with twin bifid leaflets. *Corolla* O. *Style* very short. *Stigma* simple. *Nut* tessellated, one-seeded.
Species 2. S. *Rumphii.* Sago Palm. *Rumph. Amboy.* 1. *p.* 72. *t.* 17, 18. *Loudon's Encyclopædia of Plants*, *p.* 789.
Officinal. SAGO, *Lond. Edin. Dub.* The fæcula of the stem of Sagus lævis, S. Rumphii, and other species of Palms, *L.* Farina from the interior of the trunk of various Palmaceæ and species of Cycus, *E.* Farina from the interior of the trunk of Cycus Circinalis and other species of Cycus and various Palmaceæ, *D.* Sago.

Syn. Sagou (*F.*), Sago (*G.*), Sago (*I.*), Sagu (*S.*).

The greater part of the sago of commerce is procured from the S. *Rumphii;* and the finest from S. *lævis.* Good sago is also procured from the Saguerus *Rumphii*, a native of the Indian Archipelago. S. *Rumphii* is a native of the Moluccas, Borneo, the Celebes, and is cultivated in part of New Guinea. It flourishes best in low moist situations, and seldom exceeds thirty feet in height. The trunk is thick, erect, and surrounded at the summit with a beautiful crown of large pinnate leaves, curving gracefully downwards. The flowers are in long ramose spadices: the fruit is a globular nut, covered with a chequered imbricated coat, and containing a single seed.

When the tree has attained maturity, the stem consists chiefly of spongy medullary matter, surrounded with a thin shell or cortex. As absorption of the interior takes place after the appearance of the fruit, and the stem becomes hollow, the tree is felled before this commences, and cut into billets of six or seven feet long, which are split to facilitate the extraction of the pith. It is at first in the state of a coarse powder, which is mixed with water in a trough, having a sieve at the end, through which the mixture passes into vessels, where the fecula is allowed to sudside. It is then strained off, and dried either into a kind of meal, or formed into cakes, or made into a paste and granulated [1], as it is usually found in commerce. Crawford, who has given the foregoing account of its manufacture, says that the finest is the production of

[1] The granulation is performed in large iron pans, placed over fires.

the eastern coast of Sumatra. What is termed *pearl* sago, from its pearly lustre, is made by the Chinese of Malacca.[1]

M. Planche has examined chemically the nature of this description of fecula, of which he states there are six varieties. 1. The *Sago of the Maldives* is the growth of the island of Mali. It is in roundish grains, exteriorly of a brownish-grey colour passing into white. Macerated for 24 hours it absorbs ten parts of water, and doubles its bulk; the filtered fluid is not affected by litmus, iodine, galls, or nitrate of silver, and scarcely by diacetate of lead; but when evaporated a straw-yellow extract is procured, slightly saline, and yielding a minute portion of chloride of sodium when boiled with alcohol. 2. The *Sago of Sumatra*[2] is in round white and pale-yellow grains, and exhales a musk odour, which disappears on washing it. With water it is affected in the same manner as the former variety, but the extract yields a larger proportion of chloride of sodium. 3. The *Sago of New Guinea* is the production of a Cycas, which grows in the island of Waigiou: the grains are exteriorly of a brick-red colour, passing to a dirty white. The water in which it is macerated yields also traces of chloride of sodium. 4. The *Malacca Sago* constitutes three of the varieties of M. Planche. The first, which is in irregular roundish grains of a fawn colour, passing into grey, is the production of the Sagus *Rhumphii*, and is prepared chiefly in the island of Borneo. Five hundred grains of it absorbed 544 grains of water in doubling its bulk. The water in which it was macerated precipitated chloride of silver when tested with the nitrate, and the extract consequently yielded more chloride of sodium than the other varieties. The second or *rose*-coloured variety of this sago resembles the former: the third or *white* variety differs in yielding to the water of maceration a fecula, so that it affords a magnificent blue with iodine, and is rendered turbid, and gives a precipitate with infusion of galls.[3] Sago is sometimes adulterated with an imitation made from potatoes; but it may be recognised by the form of the granules. Those of true sago are oval or ovate particles, sometimes truncated; they are convex, more or less broken, and have a circular hilum, when entire; those of potato sago are larger than those of true sago, and more ovate.

Although sago is insoluble in cold water, yet, when long boiled with it, it softens, becomes transparent, and at length forms a gelatinous solution, having all the chemical characters of starch.

Sago has no medicinal properties, but, like the other varieties of starch, it forms a useful, light nutriment for the sick and the convalescent. A table-spoonful to a pint of water forms a proper

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[1] One tree will yield nearly 600 lbs. of sago.

[2] It is never found in European markets.

[3] *Journ. de Pharmacie,* Mars, 1837, p. 115.

solution, which may be sweetened with sugar, or rendered more palatable by the addition of lemon-juice or wine, according to circumstances.

SALIX. *Spec. Plant. Willd.* iv. 703.

Cl. 22. *Ord.* 2. Diœcia Diandria. *Nat. ord.* Salicaceæ.
G. 1756. *Male. Amentum* cylindrical. *Calyx* a scale. *Corolla* none. *Gland of the base* nectariferous.
——— *Female. Amentum* cylindrical. *Calyx* a scale. *Corolla* none. *Style* bifid. *Capsule* one-celled, two-valved. *Seeds* downy.
* *With smooth serrated leaves.*
Species 10. S. *fragilis.* Crack Willow. *Smith, Flora Brit.* 1051. *Med. Bot. 3d edit.* 13. *t.* 8. *Hoffman, Sal.* ii. 9. *t.* 31. *Hayne,* xiii. 41.
*** *With villose leaves.*
Species 33. S. *alba.* White Willow. *Smith, Flora Brit.* 1071. *Hoffman, Sal.* i. 41. *t.* 7, 8. *Hayne,* xiii. 42.
Species 101. S. *caprea.* Great Round-leaved Sallow. *Smith, Flora Brit.* 1067. *Hoffman, Sal.* i. 25. *t.* 3. *f.* 1. *Hayne,* xiii. 43.

1. SALIX FRAGILIS. The Crack Willow.

Syn. Ecorce de Saule (*F.*), Weidenrinde (*G.*), Corteccia di Salico (*I.*), Corteza de Saule (*S.*).

This species of willow is indigenous, growing upon the banks of rivers, and flowering in April and May. It grows to a considerable height, sending off upright branches; which are covered with an even brownish-yellow bark, and are very fragile at the base. The leaves are petiolate, from three to five inches in length, lanceolate, pointed, obtusely serrated, inflected, and glandular; smooth on both surfaces, shining on the upper; and, in the younger ones, ciliated at the apex. There are sometimes no stipules; but, when these are present, they are rounded and obscurely toothed. The male catkin is pale, cylindrical, rather lax, with ovate downy scales. The nectary is composed of two yellow glandular scales; the larger between the stamen and the receptacle, and the smaller between the stamen and the scale. The stamens are two, filiform, and smooth. The female catkin resembles the male; with the germen egg-shaped, supporting two bifid erect stigmas. The capsule is ovate, and contains many small seeds. The bark requires to be dried in an oven moderately heated.

Qualities. — The dried bark is inodorous, bitter, and austere.

2. SALIX ALBA.[1]

Syn. Saule (*F.*) Weide (*G.*), Wilg (*Dutch*), Piil (*Dan.*), Pihl (*Swed.*), Koro Wierzbowa (*Pol.*), Berba, Betia (*Russ.*), Salice (*I.*), Sauce (*S.*), Salgueiro (*Port.*).

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[1] Ιτεα λευκη Theophrasti.

The white willow is indigenous, growing in woods and moist places, and flowering in April and May. It is a large tree, with a cracked bark, and furnished with many round spreading branches, the younger of which are silky. The leaves are alternate, on short petioles, lanceolate, pointed, acutely and regularly serrated, with the lower serratures remote and glandular; pubescent on both sides, and silky beneath: the younger ones are altogether silvery and convoluted. There are no stipules. The catkins are terminal, cylindrical, elongated, slender, and many-flowered, with elliptical, lanceolate, brown, pubescent scales. The stamens are yellow, and a little longer than the scales; the style is short; and the stigmas bipartite and thick. The capsules are nearly sessile, ovate, brownish, and smooth.

The bark of this species is easily separated all the summer. It has been used for tanning leather: and the inner part of it affords the miserable inhabitants of Kamschatka a substitute for bread.

Qualities. — The same as those of former species.

3. SALIX CAPREA.[1]

Officinal. SALICIS CORTEX, *Edin.* Willow Bark. Bark of Salix Caprea.

This species of willow is indigenous, very common in woods, flowering in April. It is a middling-sized tree, with the branches round, even, shining, and brownish, and the shoots pubescent. The leaves are alternate, petiolate, and varying in shape, being sometimes elliptical or roundish, pointed, large, undulated, waved, or serrated; smooth and dark green on the upper surface, and densely tomentose and veined on the under. The stipules are crescent-shaped or roundish, recurved, waved, and tomentose. The petioles are linear, and densely villose. The catkins appear before the leaves; are ovate, thick, many-flowered, with obovate, very hairy scales. The stamens are yellow: the stigmas nearly sessile, undivided, but at last occasionally cleft. The capsules are pedicelled, ovate, bellied at the base, and downy. Other species of salix, especially the S. *Russelliana,* might be employed in medicine in preference to those contained in the Pharmacopœia.

Qualities. — The bark of S. *Caprea,* like that of the two former species, is inodorous, bitterish, and astringent.

Willow bark has been chemically examined, and it is found that water extracts its virtues, and affords a decoction of a reddish colour, which is precipitated by a solution of isinglass, the carbonates of potassa and of ammonia, and by lime water, which throws down

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[1] *Siler* Virgilii.

a precipitate, at first blue, and afterwards buff-coloured: sulphate of iron also produces a dark-green precipitate. The watery extract is reddish, brittle, has a bitter taste, and does not deliquesce. Digested in alcohol, this bark affords a greenish-yellow tincture, which water renders turbid. When evaporated, the extract is of a bright-yellow colour, bitter, softens at a moderate heat, and emits an aromatic odour.[1] The constituents of willow bark are *tannic acid, bitter resin, extractive, gluten,* and *salicine.*

Salicine was discovered by Buchner in 1828. It has been found more abundant in some of the poplars than in the willows. It is procured by exhausting the bark with hot water, concentrating the decoction, and treating it with litharge until it becomes nearly colourless; by removing the oxide of lead by sulphuric acid, and afterwards treating with sulphuret of barium, by cautious repeated crystallization, the salicine is formed in white prismatic or needle-form crystals, very bitter, and slighty aromatic. From 250 to 300 grains of salicine have been obtained from 1 lb. of willow bark. 100 parts of water, at 67° Fahr., dissolve 5·6 of salicine: boiling water takes up an unlimited quantity. It is also soluble in alcohol; but not in ether, nor in turpentine. Concentrated sulphuric acid reddens it deeply; nitric and hydrochloric acids dissolve it without any change of colour. It is not precipitated by infusion of galls, the acetate of lead, alum, nor tartar emetic. Its formula is $C_{26}\,H_{18}\,O_{14}$.

Medical properties and uses. — These barks are tonic and astringent. They have been given as substitutes for the cinchona bark; and intermittents and remittents have yielded to their use.[2] They have also been efficaciously administered in cases of debility, dyspepsia, and pulmonary hæmorrhages, and have apparently been more serviceable in phthisis and hectic fever than the cinchona. Salicine resembles disulphate of quina in its powers as a tonic and an antiperiodic. It may be given in doses of gr. x. to ℈j. three times a day. Willow bark may be given, either in substance, or in the form of decoction. Of the powdered bark from ʒ ss. to ʒ j. is a dose, combined with aromatics, myrrh, or the cinchona bark, as circumstances direct.

SAMBUCUS. *Spec. Plant. Willd.* i. 1494.

Cl. 5. *Ord.* 3. Pentandria Trigynia. *Nat. ord.* Caprifoliaceæ.
G. 569. *Calyx* five-parted. *Corolla* five-cleft. *Berry* three-seeded.

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[1] *Ann. de Chimie*, liv. 290. *Thomson's Chemistry*, 4th edit. vol. v. p. 221.

[2] The bark of the white willow was first used by the Rev. Edmund Stone, of Chipping Norton, Oxfordshire. He gave it successfully in doses of one drachm of the powder every hour between the paroxysms, in tertians; and added one fifth of Peruvian bark, to augment its power, in obstinate quartans.—*Phil. Trans.* iii. 195.

Species 3. S. *nigra.*[1] Common Elder. *Med. Bot. 3d edit.* 596. *Smith, Flora Brit.* 336. *Eng. Bot.* 476. *Hayne*, iv. 16.
Officinal. SAMBUCUS, *Lond. Edin.* The flowers of Common Elder (recent, *L.*)

Syn. Sureau ordinaire (*F.*), Flierderblumen, Gemeine Holunder (*G.*), Flierboom (*Dutch*), Flaedes (*Swed.*), Hyld (*Dan.*), Buzina tschernaia (*Russ.*), Coorteccia, bacche, e fiori di Sambuco (*I.*), Sauco (*S.*), Sabuguerio, Uktee (*Arab.*).

The common elder is a very abundant, indigenous, middle-sized shrubby tree, growing commonly in hedges; flowering in June, and ripening its berries in September. It is much branched near the top, and covered with a roughish grey bark. The wood is white, hard, and has a large spongy pith. The leaves are pinnatisect, composed of five oval, pointed serrated segments, nearly equal at their base. The flowers are in terminal corymbose cymes, consisting of five principal branches, and many small ones, with some of the flowers sessile. They are cream-coloured; with the calyx superior and permanent, and the corolla monopetalous, rotate, and somewhat convex. The berries are globular, and when ripe of a purplish-black colour.

Qualities. — The *flowers* have a peculiar faint, sickly odour, and a bitterish taste, which are imparted to water by infusion, and also by distillation, during which a small portion of butyraceous oil is separated. The *berries* are inodorous, have a sweetish taste; and yield on expression a fine purple juice[2], which contains saccharine matter, jelly, and the malic acid. The inner bark is inodorous, and has a faint, sweetish taste, which is succeeded by a slight bitterness, and a very permanent acrimony. Both water and alcohol extract their virtues. According to Eliason, the flowers of the elder contain *volatile oil, acrid resin, tannin, oxidized* and *nitrogenous extractive, gum, glutinous matter, albumen, salts,* a *trace of sulphur,* and *lignin.*[3]

Medical properties and uses. — The flowers are excitant and diaphoretic. The berries are cooling and laxative; they were formerly much used in febrile affections, rheumatism, gout, and eruptive diseases; but they are now scarcely ever ordered. The flowers are used chiefly in fomentations and cooling ointments, and to afford their odour to water in distillation. The bark is a hydragogue purgative, and in large doses proves emetic at the same time. It is said to be efficacious in dropsy; and in smaller doses to be a useful aperient and deobstruent in various chronic affec-

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[1] Ακτη Dioscoridis. The leaves laid in the subterraneous passages of moles are said to drive them away.

[2] M. A. Chevalier has ascertained that paper stained with this juice is as delicate a test of the presence of alkalies and acids as litmus paper.—*Journ. de Pharm.* Avril, 1820.

[3] *Gmelin. Handb. d. Chim.* ii. 1279.

tions. The dose of the bark is from grs. x. to ʒ ss., given in wine; or ℥ j. may be boiled in O ij. of milk or of water down to O j., and the fourth part taken for a dose.

Officinal preparations. — *Unguentum Sambuci,* L. *Aqua Sambuci,* L. E.

SAPO. Soap.[1]

Soap is a compound of stearic, margaric, and oleic acids, with an alkaline, or an earthy, or an oxidized metallic base. Alkaline soap is that which is chiefly employed in medicine, and it has been longest known, having been invented by the Gauls at a period antecedent to historical record. Alkaline soap is of two kinds: one made with soda, and oil either animal or vegetable, or tallow, and called *hard soap*; the other made with potassa and similar oily matters, and called *soft soap.* For medical purposes it is essential that both kinds be made from the purest materials; and therefore the soap made in countries which produce olive oil, as the south of France, Italy, Tripoli, and Spain, is preferable to the soap of this country, which is penerally manufactured from grease, tallow, and other kinds of fat. The French Pharmacopœia orders medicinal soap to be prepared with fresh oil of sweet almonds; and that the soap shall not be used until it is two months old.

1. Hard Soap.

Officinal. Sapo, *Lond.* Sapo durus, *Edin. Dub.* Hard Soap. Spanish Soap. Castile Soap.

Syn. Savon blanc (*F.*), Spanische Seife (*G.*), Spaansche Zeep (*Dutch*), Silkstwal (*Swed.*), Saebe (*Dan.*), Milo (*Russ.*), Sapone duro (*I.*), Xabon (*S.*), Nāt Sowcārum (*Tam.*), Sāboon (*Duk.*).

Hard soap is manufactured in Spain in the following manner:— To five parts of barilla, coarsely ground to powder, one part of quicklime, rendered fluid with a small portion of water, is added; and after some time the clear liquor, which is a strong solution of caustic soda, is drawn off, and called the *first ley;* with the residue more water is then mixed, and drawn off after some time, and called the *second ley;* and a *third ley* is procured by another portion of water treated in a similar manner. This last ley is then mixed with a quantity of olive oil equal in weight to the barilla employed, and the mixture boiled in an iron vessel, the second ley and a portion of the first being added in a gradual manner during the boiling. The boiling mixture is constantly stirred with a wooden pole; and when it becomes tolerably thick, a small portion

[1] The name is derived, according to Beckmann, from the old German word *Sepe.* — *History of Inventions,* iii. 239.

of common salt is added, and the boiling continued for half an hour. The fire is then damped, and after some hours the clear liquor, which has separated, is drawn off, and the half-made soap again boiled with a little fresh water and the residue of the first ley. After the separation of the fluid of this boiling, it is again heated with a little water, and then poured into wooden vessels called frames, where it cools, and in a few days acquires a sufficient degree of hardness. Three parts of oil and three parts of soda produce five parts of firm soap.[1] Castile soap is made in the same manner, except that the marbled appearance which it presents is produced by the addition of sulphate of iron to a part of the alkaline ley, after the soap is fully boiled, which gives the blue colour; and the stirring in red oxide of iron, when the soap is almost made, gives the red colour.

Saponification. — Fats, both liquid and solid, consist of mixtures of different bodies: thus olive oil is a mixture of margarine and oleine; beef fat of stearine and oleine; lard of margarine and oleine, &c. When these fats are boiled with solutions of caustic alkalies they are broken up into fatty acids, and a substance called glycerine, and then during saponification salts are formed by the union of these acids and the alkali employed. *Soap* or *hard soap*, if properly prepared, should consist of margarate and oleate of soda only. Alkaline soaps are soluble in water; but if the alkaline earths are used, then soaps insoluble in water are produced. Common soaps used for domestic purposes contain stearic and palmitic acids, together with resin and impurities from the animal fats: palm oil and resin are employed.

Margaric acid, when pure, occurs in milk-white needles, insoluble in water, but soluble in alcohol, especially hot, and ether. It melts at about 140° Fahr. Formula $C_{34}\,H_{33}\,O_3 + H\,O$.

Margarine is difficult to procure free from oleine and stearine. Its melting point is 116° Fahr. It is resolved by alkalies into margaric acid and glycerine.

Stearic acid resembles margaric acid very closely, but is less soluble in cold alcohol and in ether. Its melting is higher, 158° Fahr. It is converted into margaric acid by boiling with nitric acid. Formula for stearic acid $C_{68}\,H_{66}\,O_5 + 2\,H\,O$.

Stearine is obtained by acting on mutton fat with many times its weight of ether, which dissolves the oleine and margarine. Its melting point is about 140° Fahr.

Oleic acid, a colourless liquid, lighter than water, having an acid reaction, resembling thin oil in appearance. It seems to differ when obtained from different sources. Formula of oleic acid from olive oil $C_{36}\,H_{33}\,O_3 + H\,O$.

Oleine resembles oleic acid in physical characters, but has no

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[1] *Annales de Chimie*, xix. 253.

acid reaction, and does not unite directly with alkalies without heat: by boiling with them it is resolved into oleic acid and glycerine. It is not dissolved by cold alcohol.

Glycerine. For properties, &c., see *Glycerina.*

Qualities. — Well-made hard soap, fit for medical use, has very little odour, and a nauseous, alkalescent taste; is white, and of a firm consistence; does not feel greasy, and is devoid of any saline efflorescence on the surface. With water it forms a milky, opaque solution; and with alcohol a nearly transparent, somewhat gelatinous solution.[1] It is decomposed by all the acids and acidulous salts: by alum, the chloride of calcium and the sulphate of lime, and sulphate of magnesia; in fact, by all the earths, and most of the metallic salts: thence hard water, which contains sulphate of lime, does not properly dissolve soap. Nitrate of silver; ammoniated copper; tincture of chloride of iron; ammoniated iron; acetate, chloride, and bichloride of mercury; acetate of lead; tartarized iron; tartar emetic; sulphate of zinc, of copper, and of iron; and all astringent vegetable solutions, decompose it. According to the experiments of Darcet, Lelievre, and Pelletier, 100 parts of newly-made hard soap consist of 60·94 oil, 8·56 soda, and 30·50 water: but if potassa be used, and a soft-soap formed, the proportions are 58·4 of oil, 12·3 potassa, and 29·3 of water; but these proportions vary in different kinds of soap; part of the water is lost by keeping, and the soap becomes lighter.

2. SOFT SOAP.

Officinal. SAPO MOLLIS, *Lond. Edin.* Soft Soap.

Syn. Savon Mou (*F.*), Sapone Molle (*I.*).

This soap is prepared in the same manner as the former; a caustic ley of potassa, however, being used instead of the soda ley. It was this variety of soap which was originally made by the Gauls and Germans, who employed wood-ashes to afford their ley; and these are still used in many places.[2]

Qualities. — Soft soap differs from hard soap chiefly in its consistence, which is never greater than that of hog's-lard.

Both soft and hard soap are often adulterated either with an excess of water, or with lime, or gypsum, or pipe-clay. The first, which sometimes amounts to 60 per cent., may be detected by the extent of the loss of weight in drying the soap; the other adulterations are displayed by alcohol, which dissolves the soap and leaves them.

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[1] The alcoholic solution of soap is a convenient test for discovering earthy salts in mineral waters.

[2] It is the ashes of the hard woods only that are fit for making soap; those of the resinous woods are unfit for this purpose.

Medical properties and uses. — Soap is regarded as purgative and lithontriptic; externally applied, it is stimulant and detergent. It is occasionally ordered in habitual costiveness, and in jaundice, combined with rhubarb, or some bitter extract; but its power as a purgative is very limited, and it cannot act in any other way in relieving jaundice. It is useful in some calculous affections, as its alkaline base corrects the acidity so prevalent in the stomachs of calculous patients, and, passing through the kidneys, alters the character of the urine, rendering it less acid, or even neutral or alkaline, and thus, at least, assists in checking the increase of the disease. Soap is also beneficial in decomposing some metallic poisons when taken into the stomach; and, as it is the antidote which can most readily be procured, it should always be early resorted to. It is necessary, in this latter case, to give it in solution; of which a teacupful should be drunk at short intervals, till the effects expected from it be produced. In other cases it is preferable to give it in substance. As an external remedy, soap is efficaciously used in frictions to sprains and bruises; and we have seen much benefit derived from rubbing the tumid bellies of children labouring under mesenteric fever with a strong lather of soap every morning and evening. The dose internally is from grs. iij. to ʒ ss. made into pills.

Officinal preparations of Soft and Hard Soaps. — *Pilula Saponis composita*, L. D. *Pilula Aloes cum Sapone*, L. *Emplastrum Saponis*, L. E. D. *Ceratum Saponis compositum*, L. *Linimentum Saponis*, L. E. D. Soap is contained in many other pills, liniments, &c.

SARSA. See *Smilax.*

SASSAFRAS. See *Laurus.*

SCAMMONIUM. See *Convolvulus.*

SCILLA. *Spec. Plant. Willd.* ii. 125.

Cl. 6. *Ord.* 1. Hexandria Monogynia. *Nat. ord.* Liliaceæ.
G. 640. *Corolla* six-petalled, spreading, deciduous. *Filaments* thread-like.
Species 1. S. *maritima.*[1] Officinal Squill. *Med. Bot. 3d edit.* 745. *t.* 255. *Hayne,* xi. 21. Urginea Scilla. (*Steinheil.*)
Officinal. SCILLA, *Lond. Edin. Dub.* (Squill bulb). Bulb of Urginea Scilla.

Syn. Scille (*F.*), Meerzwiebel (*G.*), Zeeajuin (*Dutch*), Skille, Strandlog (*Dan.*), Sjölok (*Swed.*), Scilla (*I.*), Cebolla albarrana (*S.*), Cebolla albarra, Alvazaraä (*Port.*), Skvilla; Morscov luk (*Russ.*).

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[1] Σκιλλη Dioscoridis. The trivial name *maritima* has been objected to, as it does not generally grow on the sea coast.

This species of squill is a native of Spain, Sicily, Syria[1], and Barbary, flowering in April and May. The bulb is large, sometimes nearly the size of the human head, of a pear shape, and formed of fleshy scales, attenuated at both edges, and closely applied one over the other. The roots are fibrous, attached to a radical plate at the bottom of the bulb. The stem is round, smooth, and succulent, rising about three feet in height from the centre of several radical, sword-shaped, straight, pointed, long leaves, of a deep-green colour. The flowers are produced in a long, close spike, upon purplish peduncles, with a linear, twisted, deciduous bract at the base of each peduncle. The corolla consists of six white, ovate, spreading petals, with a reddish mark in the middle of each; the filaments are shorter than the corolla, tapering, and furnished with oblong, transversely-placed anthers: the germen is roundish: the style and stigma are simple; and the capsule is oblong, smooth, three-celled, and contains many roundish seeds.

There are two varieties of the officinal squill; one with a white bulb, and the other with a reddish bulb; but both are indiscriminately used, and do not differ in their virtues. The bulbs are brought from the Levant generally in bulk. They are preserved fresh in sand; but as they are apt to spoil, it is preferable to keep them in the dried state.

Qualities. — The squill bulb is inodorous; its taste is bitter, nauseous, and acrid; and when much handled it inflames and ulcerates the skin. The expressed juice slightly reddens litmus paper. The acrimony, on which its virtue depends, is partially dissipated by drying and long keeping, and completely destroyed by any heat above 212°: it is extracted by water, alcohol, and vinegar. The expressed juice, when diluted with water, filtered, and boiled, does not yield flakes of albumen, as has been stated.[2] Nitrate of mercury and acetate of lead separate from the juice white curdy precipitates. Gelatin throws down a copious precipitate; and, in a less degree, the same effect is produced by lime-water and the alkaline carbonates. Infusion of galls forms in it pale brownish flakes; sulphate of iron throws down a green precipitate; lime evolves ammonia. When the insoluble part of dried squill is digested in hydrochloric acid, filtered, and ammonia added in excess, a copious precipitate is thrown down, which is citrate of lime. Ether, digested on dried squill, acquires a pale-green hue, and, when evaporated on the surface of water, a thin pellicle of very bitter resinous matter is deposited; while the water acquires an intensely bitter taste, and yields copious precipitates, with solutions

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[1] The soil at Navarino, which is remarkable for the production of an infinite quantity of squills, "is of a red colour." — *Gell's Journ. in the Morea*, p. 21.

[2] But when the expressed juice is boiled till one half is dissipated, a white precipitate is thrown down, which, when washed with alcohol, appears to be citrate of lime. — *Annales de Chimie*, vol. lxxxiii. p. 149.

of acetate of lead and nitrate of silver. Vogel, from a careful analysis of squill, gives the following as its principles: — *Gum* 6 parts; *bitter principle* (scillitin) with *saccharine matter* 35; *tannin* 24; *lignin, citrate,* and *tartrate of lime* 30; *loss* 5 = 100 parts of the dried bulb.[1] Buchner, from an analysis of the recent juice, gives the following as its constituents: — 9·47 *bitter extractive,* 3·09 *mucilage,* 0·9 *gelatinous matter,* 0·31 *phosphate of lime,* 3·38 *fibrous matter,* 79·01 *water,* and 4·40 *loss* = 100·00.[2] *Scillitin,* as described by Vogel, is white, transparent, breaks with a resinous fracture, and is pulverulent; but it attracts moisture rapidly from the atmosphere until it becomes fluid. It has an intensely bitter taste, with a slight degree of sweetness; and is very soluble in water and in alcohol and acetic acid. Landerer has found a crystalline *Scillitin,* which he stated to be alkaline; but it requires further confirmation.

Medical properties and uses. — Squill, in small doses, is expectorant and diuretic; in larger doses, emetic and purgative. Its medicinal powers were very early known; and it still retains its character as a remedy of great efficacy when judiciously exhibited. Although it operates powerfully as an expectorant, yet from its stimulating properties it cannot be given with propriety in pulmonary inflammations, until the fever and inflammatory action be previously greatly subdued by bleeding, and other evacuants; after which, by promoting a more copious excretion from the mucous follicles, it rapidly unloads the chest, and relieves the congestion and difficulty of breathing. It is more useful when combined with nitrate of potassa, tartar emetic, or ipecacuanha; and in asthma and dyspnœa without fever, squill combined with ammoniacum is, perhaps, the best remedy we can employ. In dropsies, conjoined with a mercurial and opium, the efficacy of squill is well ascertained. Its diuretic powers are much increased by this combination; perhaps depending on the absorbents being powerfully excited by the mercury, while the squill determines to the kidneys. Cullen recommends[3] the bichloride of mercury as the best adjunct; but I have seen every purpose answered by calomel. Squill is a very uncertain emetic, a very small dose producing the most cruel vomiting in some persons, while in others the largest doses do not even excite nausea: where, however, it readily and moderately induces vomiting, it proves more useful in hooping-cough and croup than any other emetic. To produce its expectorant and diuretic effects, squill must be given in substance; but to excite vomiting, its infusion in vinegar, or the oxymel, is more usually employed. Of the dried squill gr. j., in the form of a pill, may be given at

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[1] *Annales de Chimie,* vol. lxxxiii. p. 158.
[2] *Berlin Jahrb.* xv. i.
[3] *Materia Medica,* ii. 558.

first for a dose, morning and evening, or every six hours; gradually increasing the dose to grs. iij. or grs. iv., or until some degree of nausea is induced, and its expectorant or diuretic operation is obtained. In an over-dose it causes nausea, vomiting, purging: it produces strangury, bloody urine and stools, severe gripings, convulsions, cold sweats; and in many instances, but not always, death.[1]

Officinal preparations.—*Acetum Scillæ*, L. E. D. *Oxymel Scillæ*, L. *Pilulæ Scillæ comp.*, L. D. *Pilula Ipecuanhæ cum Scillâ*, L. *Pilulæ Scillæ*, E. *Syrupus Scillæ*, E. D. *Tincturæ Scillæ*, L. E. D.

SCOPARIUM. See *Cytissus.*

SECALE. See *Ergota.*

SENEGA. See *Polygala.*

SENNÆ FOLIA. See *Cassia.*

SERPENTARIÆ RADIX. See *Aristolochia.*

SEVUM. See *Ovis.*

SILEX CONTRITUS. *Lond.* Powdered flint.

This substance is prepared by heating flint to redness and throwing it into water, by which operation it is rendered very friable, and can be readily reduced to powder.

Qualities. — It occurs as white powder, tasteless but harsh, insoluble in water, and not acted on by most chemical agents, with the exception of caustic alkalies and hydro-fluoric acid. Sp. gr. 2·66, very infusible. Formula Si O_3.

Medical uses. — Powdered flint is ordered to be employed by the London College, for the purpose of mechanically dividing the oils used in the preparation of the distilled waters. Its great advantage over the carbonate of magnesia formerly ordered by the College consists in its not acting chemically on the oils. The injurious action of magnesia was pointed out by Mr. R. Warrington, who was the first to recommend the substitution of flint powder.

SIMARUBA. *Spec. Plant. Willd.* ii. 567.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Simarubaceæ.
G. 849. *Calyx* five-leaved. *Petals* five. *Nectary* five-leaved. *Drupes* five, distant, bivalve, inserted into a fleshy receptacle.

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[1] Among other cases, see one by Dr. Walfring, *Lond. and Edin. Journ. of Med. Science*, Jan. 1843.

Species 2. Simaruba *officinalis.* S. *Quassia.*[1] Simaruba. *Med. Bot.* 3*d edit.* 569. *t.* 203. *Trans. of the Royal Society of Edin.* ii. 73—81. *Hayne*, ix. 15.

Officinal. SIMARUBA AMARA, *Edin. Dub.* Simaruba root bark.

Syn. Ecorce de Simarouba (*F.*), Simarubenrinde (*G.*), Simaruba (*Swed.*), Simarube (*Dan.*), Corteccia di Simaruba (*I.*).

The Simaruba *amara* [S. *officinalis* of De Candolle], or mountain damson, as it is called in Jamaica, is a native of South America and the West Indian islands, especially Jamaica, growing in sandy places. It is a tall tree, with alternate leaves, and a smooth grey bark, maculated, in the young twigs, with yellow spots. The leaves are pinnate, consisting of from two to nine leaflets on each side, placed alternately on short petioles, elliptical, acute, smooth, and of a deep-green colour above, and whitish beneath. The flowers are male and female on the same axillary panicles: the calyx in both is monophyllous and five-toothed: the petals lanceolate, yellowish, white, and inserted into the calyx: the nectary in the male is a small scale affixed to the inner part of the base of each filament; and the same in the female, except that the scales are placed in a regular circle: the filaments of the male are the length of the corolla; and in the female are five connate germens, with five striated styles and spreading stigmas; the fruit, according to Gærtner, consist of five smooth, ovate, black, one-celled berries, on a common receptacle; and opening spontaneously when ripe.[2]

The officinal part of this tree is the bark of the root. The bark is imported in long pieces, a few inches in breadth, and folded lengthwise. It comes generally from Jamaica packed in bales. It was first brought to Europe in 1713.

Qualities. — Simaruba bark is inodorous, and has a bitter but not disagreeable taste. The pieces are of a very fibrous texture, rough, scaly, warty, transversely ridged, and of a full yellow colour in the inside when fresh. Alcohol, wine, and also water, take up all its active matter by simple maceration, at a temperature of 60° Fahr. better than at a boiling heat. The infusion is stronger in taste than the decoction, which grows turbid, and of a reddish-brown colour, as it cools. The infusion is little affected by sulphate of iron or chloride of tin. M. Morin analysed simaruba, and found

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[1] Named after Quassy, a negro slave, who discovered to Rolander the wood of the Quassia *amara*, which he had employed with success as a secret remedy in the malignant endemic fevers of Surinam. The genus is placed in the class *Decandria*, because the Quassia *amara*, from which the generic description is taken, has hermaphrodite flowers.

[2] Owing to this circumstance, Gærtner allows that the pericarp is something between a berry and a capsule. It is certainly not a drupe, although mentioned as such in the generic character by Willdenow.

in it *resin*, a *volatile oil* having the odour of benzoin, *malic* and *gallic acids*, an *ammoniacal salt*, *acetate of potassa*, *malate*, and *oxalate of lime*, *oxide of iron*, *albumen*, and a peculiar bitter principle, which has been named *quassina*[1] or *quassite*.

Medical properties and uses. — This bark is tonic; and has been employed with advantage in intermittent fever, obstinate diarrhœa, dysentery, and dyspeptic affections. It was first introduced, at Paris in 1713, as a powerful remedy in dysentery: but its effects in this disease were previously known to the natives of Guiana, whence it was brought to France. Simaruba bark, however, was little known in this country till Dr. Wright's paper on it appeared in the Edinburgh Transactions. Its influence in epidemic dysentery, in combination with opium, has been determined by Dr. O'Brien.[2] It cannot with propriety be used in the commencement of dysentery; but after the fever has abated, when the tenesmus continues, with a weak sinking state of the pulse, it allays this symptom and griping, promotes the secretion of urine, determines to the surface, and restores the tone of the intestines. It has also been highly commended as a remedy in fluor albus; but notwithstanding the character which it has acquired, Simaruba is not much employed by the British practitioner; and it is now omitted from the London Materia Medica. It may be combined with aromatics and opium. The dose in substance is from ℈j. to ʒss.; but it is more frequently and commodiously given in the form of infusion.

Officinal preparation. — *Infusum Simarubæ*, E. D.

SINAPIS.[3] *Spec. Plant. Willd.* iii. 534.

Cl. 15. *Ord.* 2. Tetradynamia Siliquosa. *Nat. ord.* Cruciferæ.

G. 1246. *Cal.* spreading. *Cor.* claws erect. *Gland* between the shorter stamens and pistil, and the longer stamens and calyx.

Species 4. S. *alba.* White Mustard. *Smith, Flora Brit.* 721. *Hayne,* viii. 39.

Species 5. S. *nigra.* Common mustard. *Med. Bot. 3d edit. t.* 151. *Smith, Flora Brit.* 722. *Hayne,* viii. 40.

Officinal. SINAPIS. *Lond. Edin. Dub.* The seed of Sinapis nigra and S. alba, *L.* The flour of the seeds of Sinapis nigra, generally mixed with those of Sinapis alba, and deprived of fixed oil by expression, *E.* The flour of the seeds of white and black mustard, *D.* Mustard-seed and flour of seed.

1. SINAPIS ALBA. White Mustard.

Syn. Moutarde (*F.*), Senfsamen (*G.*), Mostaard (*Dutch*), Sennep (*Dan.*), Senape bianca (*I.*), Grano de Mostaza (*S.*), Mostarda (*Port.*), Gortschitza (*Russ.*), Sinap (*Swed.*), Gerzykare (*Pol.*), Kabar (*Arab.*) Sirshroff (*Pers.*), Kadaghoo (*Tam.*), Rai (*Hind.*).

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[1] *Journal de Pharmacie.* Février, 1822.

[2] *Trans. of the King and Queen's Col. of Phys.* vol. i. 237. Dublin.

[3] Σινηπι Dioscoridis.

This species of mustard is an indigenous annual plant, growing in the fields and by road sides; but it is also much cultivated for salads, in which the young plant is used. It flowers in June. The root is spindle-shaped; the stem round, branched, and rising nearly two feet in height; the leaves are lyrate, rough, with strong hairs on both sides, toothed, and of a pale-green colour. The flowers are in racemes, with striated peduncles: the leaflets of the calyx are linear and green; the petals yellow, with the claws narrow, and the border obovate and entire. The pods are spreading, on almost horizontal peduncles, hispid, roundish, ribbed, swelling where the seeds are placed; and furnished with an ensiform, keeled, greenish, rough beak, longer than the pod. The seeds are large for the size of the pod, globular, and of a light yellow or pale yellowish-brown colour.

Qualities. — According to M. M. Henry, white mustard seeds, besides a *bland oil,* contains a crystallizable principle, which has been named *sinapisin,* or *sulpho-sinapisin,* and another principle resembling *emulsin.* When the two latter principles are brought together by the medium of water, a fixed acrid, inodorous compound is formed, and also sulpho-cyanic acid. *Sulpho-sinapisin* has been stated to have the composition $C_{24}\ H_{22}\ NS_2\ O_7$.

The formation of a sulpho-cyanide explains why the infusion of white mustard strikes a blood-red colour with persalts of iron.

2. Sinapis nigra.[1] Black Mustard.

Syn. Moutarde noir (*F.*), Schwarzer Senfe (*G.*), Senape (*I.*), Mostaza nigra (*S.*).

Common mustard is an indigenous annual; and although very plentiful in its wild state, yet it is cultivated for domestic and medicinal purposes. It flowers in June. The root is small. The stem, which rises two or three feet in height, is very much branched and spreading. The leaves are petiolate, the lower being lyrate and toothed, the upper lanceolate; those nearest to the root are rugged, those of the stem are smooth; and the uppermost narrow, quite entire, and hanging down, which distinguishes it at first sight from its congeners. The flowers are yellow, and small; the calyx is coloured; the pods erect, parallel to the stem, short, quadrangular, frequently smooth, many-seeded, and furnished with a short quadrangular beak. The seeds are small, globular, of a deep-brown colour, internally yellow, and inodorous, and have a bitter acrid taste.

Although the seeds of these two species of mustard differ in their botanical characters, yet they agree in many other respects;

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[1] Νάπυ Hippocratis.

the black is much more pungent than the white. The mark of the two mixed together, after the oil is expressed, reduced to a fine powder, forms the common condiment every day used at our tables. But it is often adulterated with flour, cayenne pepper, and turmeric.

Qualities. — These seeds, in the entire state, are nearly inodorous, but when bruised and moistened they have a pungent, penetrating odour. Their taste is bitterish, acrid, and biting. Unbruised mustard-seeds, when macerated in boiling water, yield an insipid mucilage, which resides in the skin; but, when bruised, the water takes up the principles which form their active matter, although it is scarcely imparted to alcohol. They contain a fixed bland oil, which is purgative in large doses. The marc, after the expression of this oil, is formed into flour of mustard, and retains the principles of the acrimony, for which it is used. In distillation with water, black mustard-seeds yield a very acrid volatile oil, on which their virtues depend. It is supposed not to exist ready formed in the seeds, but its elements only, in the form of an acid combined with potassa; and another substance having some analogy to emulsin. M. Bussy has named the acid *myronic acid,* and the other substance *myrosyne.* This myronic acid exists in the mustard in the form of a myronate of potassa, which, when mixed in solution with the myrosyne, forms the volatile oil: its acrimony appears to be obtunded by a soft, insipid, fixed oil, which, as already stated, can be separated by pressure; and the cake left after the expression is considerably more pungent and acrid than the unpressed seeds. The acrimony is not dissipated by drying, nor by keeping the seeds. The active principle of black mustard is a volatile oil, which, as above stated, does not pre-exist in the seed, and which requires the presence of water for its development.[1] The constituents of the mustards appear to be *myronate of potassa, myrosin, fixed oil, fatty matter, gum, sugar, colouring matter, sinapisin, free acid, a green substance,* and *salts.*[2] The *volatile oil* of black mustard occurs as slightly coloured or colourless when quite pure, of very powerful odour, causing lachrymation when it comes in contact with the eyes. Sp. gr. 1015; boils at 289° F.; decomposed by nitric acid with violence, and resolved by alkalies into ammonia, and an alkaline sulphuret and sulpho-cyanide. Its composition is represented by $C_8 H_5 N S_2$. It forms with ammonia a compound resembling an alkaloid — Thiosinnamine.

Medical properties and uses. — Mustard-seeds are stimulant, emetic, diuretic, and rubefacient. Swallowed whole, they have been thought to be useful in dyspepsia, chlorosis, and the torpid

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[1] It has been examined by MM. Hesse, Hoffmann, Fauré, Wittstock, and Aschoff, Boutron and Frèmy, and Bassy.

[2] *Journ. de Pharm.* xxvi. 48.

state of the intestines which accompanies paralysis: but their aperient influence depends solely on the mechanical stimulus given by the seeds germinating in the intestines. The farina, or flour, to the extent of a large teaspoonful mixed with water, forms an excellent emetic in paralytic, epileptic, and some apoplectic cases, often operating quickly and fully, when other emetics fail. In small doses they are found to promote considerably the secretion of urine; and consequently they prove beneficial in dropsies. In these affections, however, perhaps the best mode of exhibiting mustard is in the form of whey, which is made by boiling ℥ iv. of the bruised seeds in Oj. of milk, and straining to separate the curd. A fourth part of this quantity may be taken for a dose three times a day. But mustard is most frequently employed as an external remedy. The flour rubbed on the skin, or applied in the form of a cataplasm, made with crumbs of bread and water [1], soon excites a sense of pain, considerable inflammation, and sometimes vesication. The volatile oil is a violent rubefacient. In the form of cataplasm, mustard has been found serviceable in paralysis; and, when applied to the soles of the feet, in the delirium of typhus, and in comatose affections. It is proper to limit the period of the application of the cataplasm within the time of vesication, as where this occurs it is apt to run on to ulceration and gangrene.

Officinal preparation.— *Cataplasma Sinapis*, L.

SMILAX.[2] *Spec. Plant. Willd.* iv. 774.

Cl. 22. *Ord.* 6. Diœcia Hexandria. *Nat. ord.* Smilaceæ.

G. 1800. *Male.* *Calyx* six-leaved. *Corolla* none.

——— *Female.* *Calyx* six-leaved. *Cor.* none. *Styles* three. *Berry* three-celled. *Seeds* two.

* *Stem prickly, angular.*

Species 9. S. *officinalis.* Sarsaparilla plant.[3] Humboldt, *Plant. Æquinoct.* 1. 271.

Officinal. SARZA, *Lond. Edin. Dub.* Sarsaparilla root. The root of Smilax officinalis (Kunth.) Jamaica Sarsa, *L. D.* The root of Smilax officinalis (Humb. and Bonpl.), and probably other species, *E.*

Syn. Racine de Salsepareille (*F.*), Sarsaparill, Sassaparille (*G.*), Sarzaparille (*Dutch*), Sarzaparil (*Dan.*), Sassaparel (*Russ.*), Salsapariglia (*I.*), Zarzaparrilla (*S.*), Salsaparilha (*Port.*), Juapecanha (*Brazil.*).

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[1] Vinegar is usually ordered; but experiments have proved that water developes the acrimony of mustard better than vinegar.

[2] Σμιλαξ Dioscoridis.

[3] Bauhin derives the name from *zarsa*, which, he says, is the Spanish for red; and *parilla*, a little vine. The latter part of the derivation is correct; but we are inclined to think the first part must be referred to *zarza*, a brier or bush: hence Zarzaparilla would imply *a bushy little vine.*

There is still some doubt as to the real plant which yields the sarsaparilla of commerce. The Smilax *sarsaparilla,* and the Smilax *medica,* are said to yield the Vera Cruz sarza; but the Jamaica and Honduras sarzas are most probably the root of the officinal plant. Smilax *officinalis* is a native of South America, growing on the river Magdalena, in Columbia. The roots are somewhat thicker than a goose-quill, straight, externally brown, internally white, and three or four feet in length. The stems are shrubby, long, slender, scandent, and beset with spines: the leaves alternate, petiolate, oblong-oval, pointed, cordate, coriaceous, smooth, with five to seven costæ. The flowers stand three or four together upon a common peduncle; the calyx of the *male* flower is bell-shaped, coloured, with the segments oblong, spreading, and reflected at their points: the filaments are six, simple, and bearing oblong anthers: the calyx of the *female* flower is also bell-shaped: the germen ovate, supporting three minute styles, with oblong, reflexed, hairy stigmas: and the fruit a round, three-celled berry, containing two globular seeds. But the roots of several species of smilax, as already stated, are gathered under the name of sarsaparilla. The sarsaparillas of commerce are also obtained from other species, as *Smilax sarsaparilla* (?), S. *medica,* S. *syphilitica,* S. *papyracea,* &c.

Sarsaparilla is known in commerce by the names of *Jamaica* (the variety made officinal by the London and Dublin Colleges), *Honduras, Lisbon* or *Brazilian, Vera Cruz, Caraccas, Lima,* &c. It consists of the dried roots, which are usually several feet in length, folded or not, of an average thickness of a goose-quill; of a grey, greyish-brown, brown, or reddish-brown colour; wrinkled longitudinally, flexible, with radicles, more or less numerous, attached (bearded sarsaparilla), with the rhizome or chump occasionally present; sometimes thin and shrivelled (lean sarsaparilla); sometimes swollen and knotty (gouty sarsaparilla): frequently the roots are twisted spirally. In consistence sarsaparilla is brittle, and when broken transversely gives off more or less powder (starch granules); when this occurs in considerable quantity it is said to be mealy.

Many attempts at classifying these different kinds have been made; some taking the presence or absence of the chump or rhizome, also the folded or unfolded condition in which it is sent, &c.: but these distinctions throw but little light on the essential peculiarities of the different kinds, or on their medicinal value. Dr. Pereira takes the anatomical characters of the stem as the basis of classification, dividing them into mealy and non-mealy varieties. If we examine a transverse section of the root of any kind of sarsaparilla, we find that it consists of a cortex or rind, and a meditullium or woody cord. Dr. Pereira[1] thus describes the

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[1] *Materia Medica,* 3d edit.

transverse section:—"The *cortex,* or *rind,* consists, first, of the *cuticle* or *epidermis,* composed of compact cells; 2ndly, of the *outer cortical layers,* composed of coloured (from golden-yellow to deep orange-red), elongated, thick, flattened cells (some of which are porous), which form a *sub-cuticular tissue* (*epiphlœum* or *periderm?*); and 3rdly, of the *inner cortical layers,* consisting of shorter, thinner, cylindrical, often porous cells, with large intercellular spaces. In some sorts of sarsaparilla most of these cells abound in starch, while a few contain bundles of acicular crystals (oxalate of lime?), called Raphides. The mealy cortex is frequently colourless, but sometimes has a roseate tint.

"The *ligneous cord* or *meditullium* consists of, 1st, a *cellular layer* (liber?), called by Schleiden the *Keruscheide,* or *nucleus sheath,* whose cells are empty, thick and strongly coloured (like those of the outer cortical layers); 2ndly, a *woody zone,* called by Schleiden the *Gefässbündelkreis,* or *vascular-bundle circle,* usually of a pale yellowish colour, and composed of woody tissue, vessels, and cambial cells; and 3rdly, *medulla,* or *pith,* generally colourless, composed of cylindrical cells (like those of the inner cortical layers), which often abound in starch. Sometimes an isolated vessel, or a small group of vessels, surrounded by a thin layer of ligneous cells, is seen in the pith. The chief anatomical characters, which vary in the different species of sarsaparilla, are the relative breadths of the cortical, ligneous, and medullary layers, the characters of the cells of the nucleus sheath, and the number of layers composing the subcuticular tissue."

The two varieties are thus described by Dr. Pereira:—

Mealy Sarsaparillas.[1] — "These are characterised by the mealy character of the inner cortical layers, which are white or pale-coloured. The meal or starch is sometimes so abundant, that a shower of it, in the form of white dust, falls when we fracture the roots. The thickest mealy coat which I have measured was barely $\frac{1}{10}$ of an inch in thickness. Compared with the diameter of the meditullium, or ligneous cord, the thickness of the mealy coat, is sometimes nearly equal to it, but usually does not exceed $\frac{1}{3}$ or $\frac{1}{2}$ of it. The thick mealy roots have a swollen appearance, and are technically called *gouty* by the dealers: the cortex, being brittle, is frequently cracked transversely in rings, and readily falls off. The colour of the mealy coat varies from white to yellowish or pinkish. The medulla or pith is frequently very amylaceous. If a drop of oil of vitriol be applied to a transverse section of the root of mealy sarsaparilla, the mealy coat is *but little altered in colour,* while the woody zone becomes dark-purplish or almost black. Sometimes the pith also acquires a darkish tint. A decoction of mealy sarsaparilla, when cold, becomes dark-blue on the

[1] *Materia Medica,* 3d edit.

addition of tincture of iodine. The aqueous extract of mealy sarsaparilla, when rubbed down with distilled water in a mortar, does not completely dissolve, but yields a turbid liquid, which becomes blue on the addition of iodine."

Non-Mealy Sarsaparillas.—"The sarsaparillas of this division are characterised by a deeply-coloured (red or brown), usually non-mealy cortex. The cortex is red, and much thinner than in the mealy sorts. Although by the microscope starch grains can be detected in the inner cortical layers, yet their number is comparatively small, and is quite insufficient to give the mealiness which characterises the sarsaparillas of the first division. The diameter of the meditullium or ligneous cord is much greater than in the mealy sarsaparillas, and is frequently six or more times greater than the thickness of the cortex. The roots have never that swollen appearance called by dealers gouty, and which is frequently observed in the mealy sorts. Starch grains are usually recognisable in the pith by the microscope. If a drop of oil of vitriol be applied to a transverse section of the root of the non-mealy sarsaparillas, both cortex and wood acquire a dark-red or purplish tint. A decoction of non-mealy sarsaparilla, when cold, does not yield a blue colour when a solution of iodine is added to it."

Under the head of Mealy Sarsaparillas are classed the *Honduras*, *Brazilian* or *Lisbon*, and the *Caraccas* or *gouty Vera Cruz*. The non-mealy class includes the Jamaica, Lima, and true Vera Cruz.

1. *Honduras Sarsaparilla* occurs in bundles nearly three feet long, composed of the folded roots, secured by a few circular twists: it has a dirty brown colour, sometimes greyish; there are many lateral fibres, but no chump: it is very mealy, giving off much powder, and the extract obtained from it is scanty. It is brought from the Bay of Honduras.

2. *Brazilian*, or *Lisbon*, or *Rio Nigro Sarsaparilla*, in bundles from three to five feet in length, and about one foot in diameter, composed of the unfolded roots, which are bound round very tightly with a flexible stem: it has few rootlets, is of a reddish-brown colour, of bitter nauseous taste, and mealy in character: it has been much esteemed by some. It comes by way of Lisbon, and from the Brazilian ports, and is probably derived from Smilax papyracea and Smilax officinalis.

3. *Caraccas Sarsaparilla* (gouty Vera Cruz) occurs in flattened bundles, about two feet and a half long, and one foot broad; colour, pale yellow; very mealy: the chump is present. It is probably derived from Smilax officinalis and Smilax syphilitica, and is imported sometimes from Valparaiso.

4. *Jamaica red, or bearded Sarsaparilla*, consists of bundles from twelve to eighteen inches in length, composed of spirally-twisted

roots, folded, with long and numerous rootlets, hence called *bearded Sarsaparilla.* Colour, red or orange-red; it is not mealy, and yields a large amount of extract. It is probably derived from the plant made officinal, viz. Smilax officinalis. It is not grown in Jamaica, but only imported by way of that island. Probably, according to Dr. Wood, it is derived from Central America.

5. *Lima or Valparaiso Sarsaparilla* occurs in bundles of about two or three feet in length, with the rhizome or chump attached, and contained in the interior. It has a greyish-brown colour, not mealy, of good quality, but yields less extract than the Jamaica. It is probably derived from Smilax officinalis, and imported from Lima, Valparaiso, Costa Rica, &c.

6. *Vera Cruz* (true or lean) is not often found in commerce: it occurs in unfolded bundles, about two feet long, with few rootlets; the chump is present. The colour is greyish-brown, and it is not mealy. It is derived from Smilax medica, and imported from Vera Cruz.

Qualities. — This root is inodorous, and has a mucilaginous, very slightly bitter taste. The mucilaginous character differs in the different varieties. The whole of the efficacious part of the plant resides in the bark, the ligneous part being tasteless, inert, woody fibre. The root when macerated communicates to cold as well as to boiling water, and partially to alcohol and ether, any active matter it possesses. The watery infusion has a brown colour, slightly reddens litmus paper, and yields a precipitate with infusion of galls, which is again dissolved when the infusion is heated, demonstrating its close affinity to starch. It is precipitated also by lime-water, and solution of nitrate of mercury, and the acetates of lead; but although its colour is deepened, yet it is not much affected by sulphate of iron, nor any other of the metallic oxides. Blue iodide of amidine is formed when solution of iodine is added to the decoction of Honduras and Lisbon sarza. The alcoholic tincture has a yellowish-red hue, is rendered turbid by the addition of water, and yields a slightly bitter pungent extract. Ether takes up two parts in ten of the powdered root; and the tincture, which has a golden-yellow colour when evaporated on water, leaves a small portion of reddish-yellow insipid resin, and a larger of yellowish extractive dissolved in the water. The root brought from Jamaica yields rather more than two parts for one of extract yielded by the other kinds, and is therefore regarded as the best for medicinal use. M. Galileo Pallota has separated from it an alkaloid substance, in which he supposes the virtue of the root resides, and has named it *parillina:* it is the *smilacin* of Folchi, the *salseparin* of Thubœuf. This principle is white, pulverulent, light, nearly inodorus, permanent in the air, austere, slightly astringent, and nauseous. It is insoluble in cold, but very soluble in hot water; slightly soluble in cold alcohol, but much more

soluble in hot; soluble also in ether and oils. Its watery solution froths when shaken. It fuses at 212°, and is decomposed at a higher temperature. It dissolves in the dilute mineral acids, but is decomposed by, and colours red, strong sulphuric acid, which afterwards becomes violet and yellow: its solution in strong hydrochloric acid becomes red and gelatinous when heated; it is also decomposed by strong nitric acid, with the evolution of nitrous vapours. Its composition is at present doubtful. Henry states its formula to be $C_9 H_9 O_3$ (?). Thubœuf analysed sarza, and obtained — 1. a *crystallized principle*, the *parillina* of Pallota; 2. *colouring matter;* 3. *resin;* 4. *starch;* 5. *lignin;* 6. a *fixed oil;* 7. *wax;* 8. *chloride of potassium* and *nitrate of potassa.*[1]

Medical properties and uses. — Sarsaparilla is said to be diaphoretic, tonic, diuretic, and alterative in moderate doses; but little satisfactory is known respecting its physiological action. In large doses, Dr. Hancock affirms that it is emetic, and in more moderate doses narcotic.[2] It was brought to Europe about the year 1563, and introduced as a medicine of great efficacy in the cure of lues venerea; but it fell into disrepute, and was little used, till it was again brought into esteem by Dr. William Hunter and Sir William Fordyce, about the middle of the last century; not, however, as a remedy fitted to cure syphilis[3], but of much efficacy in rendering a mercurial course more certain, and after the use of mercury.[4] Experience, however, has not verified the encomiums bestowed on it; and the extensive observations of Mr. Pearson have fixed the degree of benefit which is to be expected from this root in syphilitic complaints. "The contagious matter, and the mineral specific, may," he observes, "jointly produce, in certain habits of body, a new series of symptoms, which, strictly speaking, are not venereal[5]; which cannot be cured by mercury, and which are sometimes more to be dreaded than the simple and natural effects of the venereal virus. Some of the most formidable of these appearances may be removed by sarsaparilla, the venereal virus still remaining in the system; and when the force of the poison has been completely subdued by mercury, the same vegetable is also capable of freeing the patient from what may be called the sequelæ of a mercurial

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[1] *Journ. de Pharm.* xx. p. 43.

[2] *Trans. Med. Bot. Soc.* 1829.

[3] The celebrated Mutis, in a letter to the younger Linnæus, says, "Scarcely any *Lues Venerea* resists my method of administering a drink of this medicine." (*Correspondence of Linnæus*, vol. ii. p. 549.) But we must recollect that syphilitic complaints are as benign as they are common, both among the white and the mixed castes, in South America; and as they yield to this remedy, the quantity of sarsaparilla employed in the Spanish colonies is very considerable. See *Humboldt*'s *Pers. Nar.* vol. v. p. 379.

[4] *Medical Observations and Inquiries*, vol. i.

[5] The symptoms alluded to are nocturnal pains in the limbs, painful enlargements of the knee and elbow joints, membranous nodes and cutaneous ulcerations, arising after a full course of mercury.

course."[1] Sarsaparilla is recommended in scrofula, elephantiasis, and cutaneous affections, chronic rheumatism, and cachectic conditions of the habit; but its efficacy is doubtful. From experiment made upon himself, M. Pallota considers that parillina (*smilacin*) is a powerful debilitating medicine, diminishing the vital energy in proportion to the dose.

The dose of the powdered root of Sarza is from ℈ j. to ʒ ij., given three or four times a day. In doses of ʒ iv. it nauseates, and causes vomiting. Of the smilacin from grs. ii. to grs. xiii. may be given for a dose.

Officinal preparations.—*Decoctum Sarzæ*, L. E. *Decoctum Sarsaparillæ*, D. *Decoctum Sarzæ compositum*, L. E. *Decoctum Sarsaparillæ compositum*, D. *Extractum Sarzæ liquidum*, L. *Extractum Sarzæ fluidum*, E. *Extractum Sarsaparillæ fluidum*, D. *Syrupus Sarzæ*, L. E.

SODÆ BIBORAS.

BORAX[2], *Lond. Edin. Dub.* Bi-borate of Soda. Borax.

Syn. Borate alcalinule de Soude (*F.*), Borsaures Natron, Borax (*G.*), Borax (*Dutch, Swed., Dan.*), Bornokislie Natr, Bura (*Russ.*), Borace, Borate di Soda (*I.*), Borrax (*S.*), Tineal (*Port.*), Buruk (*Arab.*), Tunka (*Pers.*), Tancána (*San.*), Sohaga (*H.*), Valligarum (*Tam.*), Patteric (*Malay*), Pigar (*Jav.*).

This is the purified state of a natural salt found in Persia and Thibet. In the latter country it is formed in the bed of a lake, situated among the mountains, fifteen days' journey from Tisoolumboo, which is twenty miles in circumference, and supplied only by springs from the bottom.[3] The borax is dug in large masses from the edges and shallows of the lake; yet the quantity is not diminished, the cavities being gradually filled by a fresh deposition of the salt. In this state it is named *tincal*, and was formerly brought to Europe packed in chests, in masses of adhering crystals, of a grey, yellowish, or greenish-white colour, intermixed with sand and other impurities, and covered with a greasy, artificial production, to prevent it from efflorescing. The purification of tincal was first discovered by the Venetians; and afterwards long carried on by the Dutch, who kept the process secret. Pelletier has ascertained, that, by destroying the unctuous matter by calcination, the salt may be obtained pure by simple solution and crystallization.[4] His method has been practised in England: but at present scarcely any tincal is imported; and the greater part of the borax

[1] *Pearson on Remedies for Lues Venerea*, p. 24.

[2] The term *borax* is a corruption of the Arabic word *buruk*, which signifies *brilliant*. Vide *Asiatic Researches*, 8vo. vol. iii. p. 255. It is supposed to be the *Chrysocolla* of Pliny. *Hist. Nat.* l. xxxiii.

[3] Saunders, *Phil. Trans.* vol. lxxix. p. 97.

[4] *Mémoires de Chimie*, vol. i. p. 82.

used in England is made by saturating the boracic acid, procured from the vapour-springs of Volterra, near Leghorn[1], with carbonate of soda. The crude acid contains about 20 per cent. of impurities, which separate during the preparation of the bi-borate. The acid is added to the solution of the alkaline carbonate, and the mixed solution boiled, and then left for ten or twelve hours to settle; after which the solution is drawn off and crystallized.

Qualities. — Purified bi-borate of soda is inodorous, and has a styptic, cool, alkalescent taste. It is of a white colour, and usually in irregular, crystalline masses, approaching to the form of hexangular prisms, terminated by triangular pyramids. It effloresces slowly and very slightly in the air; dissolves in twenty times its weight of water at 60° Fahr., and in six times its weight of boiling water; the solution changing the vegetable blues to green. In a moderate heat it undergoes the watery fusion, loses four-tenths of its weight, and becomes a dry, white, spongy mass, without undergoing any decomposition. Borax is a bi-borate of soda, consisting of 2 eq. of boracic acid ($B\,O_3$) + 1 eq. of soda, and, in the crystallized state, the salt contains 10 eq. of water. Formula, $Na\,O,\ 2\ B\,O_3 + 10\ H\,O$.

From a boiling saturated solution of this salt, sulphuric acid precipitates boracic acid in white crystalline scales. It is decomposed by the majority of the acids; by potassa, and the sulphates, hydrochlorates, phosphates, and fluates of the earths, and of ammonia.

Medical properties and uses. — This salt is refrigerant, diuretic, and detergent. I have given it internally, in apthous affections, and in excessive salivation, with much advantage; and as a diuretic in ascites. It is a useful topical application when mixed with honey, in aphthæ of the mouth. Dr. Pereira says that it has been found beneficial as a detergent in pityriasis versicolor.[2]

Officinal preparation.—*Mel Boracis,* L. E. D.

SODÆ BICARBONAS, *Lond.* See Part III.

SODÆ CARBONAS, *Lond. Edin.* SODÆ CARBONAS CRYSTALLIZATUM, *Dub.* Carbonate of Soda (crystallized.)

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[1] The following is the method of making the acid at Volterra. A cavity or basin is dug round the natural openings whence the vapour issues, and a small stream of water conducted into it: but as soon as the basin is filled the stream is turned aside. The vapour is condensed in the water of the basin, and the heat, which it evolves, aiding the spontaneous evaporation of the water, this gradually becomes a concentrated solution of boracic acid, and is transferred to leaden troughs, in which it is further concentrated by the assistance of fire. The solution is then put into casks, on the sides of which the boracic acid is deposited in crystals, which are collected, and, without any further purification, are brought to market.

[2] *Elements of Mat. Med.* 543.

Syn. Cristaux de Soude (*F.*), Kohlensaures Natron (*G.*), Soda (*Dan.*, *Swed.*), Uglekisloi Natr (*Russ.*), Loogzout (*Dutch*), Carbonato di Soda (*I.*), Barilla (*S.*), Charuni (*Malab.*). Sejjimitti (*H.*), Sorjica (*San.*), Karum (*Tam.*).

Carbonate of soda is found native in Hungary, Syria, Egypt, Arabia, Thibet, India, China, Siberia, and South America, on the surface of the earth, and on the margins of some lakes which become dry in summer.[1] A large quantity is annually collected from the natron lakes of Hungary in the vicinity of Debretzin, and from those of Egypt, situated in the valley Bahr-bela-ma, near the Delta. The Trona lake, which lies between Wadies Shiati and Ghrurbi, yields annually between 400 and 500 camel-loads, each equal to about 4 cwt. It is obtained by a man wading into the lake and breaking it off in sheets, which are afterwards packed in the setose bases of the palm leaves.[2] It is named szekso in Hungary, and *trona* by the natives of Egypt: but very little of it finds its way to Britain; and the greater part of that which is employed, in this country at least, is of vegetable origin, being prepared from the ashes of some species of *algæ:* but it is more abundantly prepared from the ashes of the Salsola *Soda* and Salicornia *herbacea,* plants which are cultivated on the shores of the Mediterranean, by the Spaniards, expressly for the purpose of yielding this salt. In the vicinity of Alicant, and near Carthagena, two hundred thousand quintals of Salsola *Salicornia,* cultivated there, are gathered annually. In September, when the seed is ripe, the plant is pulled up by the roots; after which it is dried, and in October it is burnt in simple furnaces, the heat of which is just sufficient to cause the ashes to enter into a state of semifusion, and concrete into cellular masses, which form the *barilla* of commerce. The barilla of Ustica in Sicily is esteemed the finest in Europe: it is the produce of Salsola *sativa,* and its excellence is supposed to depend on the plant being burnt before it is thoroughly dry.[3] Sardinia furnishes some barilla, but inferior in quality to the Spanish. In Sicily, barilla is procured at *Catania, Trapani, Marsala, Terranora*, and *Girgenti.* The French barilla is procured chiefly from Salicornia *herbacea:* the best is that of

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[1] Νιτρον of the ancients. This term was converted in the middle ages into *natrum* or *natron*; while the real word Νιτρον was improperly applied to nitre; but the ancients were unacquainted with nitre; and the term *natrum* is never found in the works of the Greeks or the Romans, and not even in those of good writers of the middle ages. Beckmann proves that nitre was not known, even in Europe, till the invention of gunpowder. *Hist. of Inventions*, iv. p. 537.

Native carbonate of soda is found in considerable quantity in a small lake, near the Indian village Lagunillas, situated to the south-east of Merida, in the republic of Colombia. It is termed *Urao* by the natives. It contains one fourth more soda than the Trona of Egypt, and more carbonic acid than the artificial carbonate. — *Annales de Chimie*, tom. xxix. p. 110.

[2] Letter from Dr. Oudney to Professor Jameson. — *Edin. Phil. Journ.* vol. xi. p. 384.

[3] *Smyth's Sicily and its Islands*, 4to. p. 15.

Narbonne. That which is obtained in this country by burning the sea-wrack (chiefly the Fucus *vesiculosus* and *serratus*) is denominated *kelp ;* and is the worst description of this salt.[1] Orkney furnishes annually about three thousand tons of kelp.[2]

Vauquelin has proved that the salt exists ready formed in Salsola *Soda*, and is only set free by the burning of the plant.[3] He obtained from 500 parts of the plant 100 parts of ashes, besides oil, ammonia, and hydrocyanic acid; but the plant also contains iodine. Five hundred grains of the ashes afforded 113 of chloride of sodium, 68 dry carbonate of soda, 204 insoluble carbonate of magnesia, 100 of sand and oxide of iron, and 23 of water[4]; an analysis which may be regarded as exhibiting the general components of barilla.[5]

There are several varieties of barilla brought from Spain; that which is known by the name of *sweet barilla* is the most esteemed. A tolerably pure carbonate of soda is obtained in this country and in France from sea-salt. To a solution of one part of salt three parts of finely-pulverised litharge are added, and rather more than half a part of chalk. These are agitated well together, and then set apart: a double decomposition gradually takes place, chlorides of lead and of calcium are formed; while the soda, uniting with the carbonic acid set free from the chalk, crystallizes, and is easily separated. In Britain it is now obtained from common salt, by first forming a sulphate of soda, by decomposing the chloride of sodium by means of oil of vitriol, and then submitting the sulphate so formed, mixed with lime and small coal, to the action of heat, by which means it is converted first into the sulphuret of sodium, which reacts on the lime, and thus a sulphuret of calcium and carbonate of soda are formed, along with great excess of lime; it is then lixiviated with water, and the solution evaporated to dryness, and the dried residue (soda-ash) burnt with sawdust in order to convert the whole into a carbonate; it is afterwards re-dissolved in water, and the ley evaporated and crystallized.

Qualities. — Good impure carbonate of soda (soda-ash) is in hard, dry, spongy, sonorous masses, of a greyish-blue colour, which become covered over with a saline efflorescence when

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[1] The inhabitants of the Canary Isles extract carbonate of soda from the ashes of the Mesembryanthemum *crystallinum*, or ice-plant, which yield one-third of their weight of the salt. — *Phil. Mag.* vi. 187.

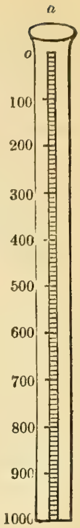
[2] The sea-wrack is cut from the rocks in April and May chiefly, dried in the air, and then burnt in a kiln, in which they are stirred with an iron rake into a fluid state ; on cooling the ashes condense into a dark blue or whitish mass, very hard and solid. The plants about three years old yield the largest quantity of kelp. The best kelp has an acrid caustic taste ; a sulphurous odour ; is compact, and of a dark-blue greenish colour. It yields about one-twentieth part of its weight of soda.

[3] *Annales de Chimie*, xiii. 65.

[4] *Id.* xviii. 76.

[5] One pound of good barilla will yield from ℥ iij. to ℥ v. of carbonate of soda.

exposed to the air. It should not emit any unpleasant odour on solution; and when applied to the tongue should impress a sharp, alkaline taste. To ascertain the value of any specimen, take diluted sulphuric acid, containing one grain of real acid in 10 grains of water; then weigh 50 grains of the alkaline salt, and dissolve them in water. The alkalimeter *a* is then to be filled with the acid to *o*, and the alkali carefully neutralized with it; and the quantity of acid required ascertained. If 33 measures of acid are required, the alkali contains 25·5 of soda in 50 grains.



S. acid.		Soda.		S. acid.		Soda.
40·1	:	31·3	: :	33	:	25·5[1]

Carbonate of soda when pure has a mild alkalescent taste, and displays an alkaline reaction; its crystals are large, transparent, rhombic, octohedrous, truncated at the angles, and contain a large amount of water; they effloresce when exposed to a dry air, and crumble down into a white, opaque powder.

They undergo the watery fusion at 150° F.; are soluble in two parts of water at 60° F., and in considerably less than their own weight of boiling water. The formula of the salt is $NaO, CO_2 + 10 HO$.

Medical properties and uses.—This salt is antacid and deobstruent. It is less acrid than the carbonate of potassa, and hence is in more general use in dyspepsia and acidities of the stomach, and in scrofulous affections. Its use has been recommended in hooping cough, the protraction of which it is said to prevent. It is given, after the stomach and bowels have been duly evacuated, at first in combination with ipecacuanha and opium, and afterwards, when the violence of the cough has abated, with myrrh or cinchona. The dose of this salt is from grs. x. to ʒ ss. given twice or thrice a day. M. Peschier has successfully employed it for the cure of bronchocele, and he considers it much more efficacious than iodine in this disease.[2] In bronchocele, M. Peschier gave it to the amount of 118 grains in a day, dissolved in water. It may be used for making the effervescing draught; a scruple of it in solution requiring 9¾ grains of citric acid, or f ʒ ij. ss. of recent lemon juice, for its saturation.

Officinal preparations.—*Sodæ Carbonas exsiccata*, L. *Sodæ Carbonas siccatum*, E. D. *Sodæ Carbonatis Liquor*, D.

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[1] *Pharm. Journ.* vol. ii. 569. [2] *Bib. Univer.* xxvii. 146.

SODÆ MURIAS. See *Sodii Chloridum.*

SODÆ PHOSPHAS. *Lond. See* Part III.

SODÆ POTASSIO SARTRAS. *Lond. See* Part III.

SODÆ SULPHAS. *Lond. Dub.* Sulphate of Soda.

Syn. Sulphate de Soude (*F.*), Krystallisirtes Schwefelsaures Natrum, Glaubersalz (*G.*), Sale mirabile di Glaubero (*I.*), C'hara Nún (*H.*).

This salt is found native in combination with oxide of iron, chloride of sodium, and carbonate of soda, and sometimes effloresced on the surface of the soil in the neighbourhood of salt lakes in Hungary and North America.[1] It is also found effloresced in caves near the villa Mulighin, in the Canton of Argovie; and very often forming part of the contents of mineral saline springs, as those of Cheltenham and of Carlsbad. But the greater part of it used in this country is artificially prepared, and chiefly in the large way, during the manufacture of sal ammoniac from sulphate of ammonia and common salt. The Edinburgh College has a formula also given for its preparation; I shall therefore defer the consideration of its qualities and uses till it come under notice among the *Preparations.* (See Part III.)

SODII CHLORIDUM, *Lond. Dub.* MURIAS SODÆ. *Edin.* Chloride of Sodium. Muriate of Soda. Common Salt.

Syn. Chlorure de Sodium (*F.*), Salzaures Natrum, Kochsalz (*G.*), Zout (*Dutch, Belg.*), Salt (*Dan., Swed.*), Sal commune (*I.*), Sal (*S.*), Sal comun (*Port.*), Chloristoi natvie (*Russ.*), Mélh (*Arab.*), Poppoo (*Tam.*), Loon (*H.*), Nemuck (*Pers.*), Locnoo (*Cyng.*), Lavana (*Sans.*), Garam (*Malay*), Uyah (*Jav.*), Tarrĕĕke (*Esquimaux*).

This salt is one of the most abundant productions of nature, being found in almost every country of every quarter of the globe; either existing in mineral springs[2] or lakes[3], spread in strata under

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[1] To the north of Carlton House, on the river Skatchawan, lat. 53° 20′, is a small lake, on the shores of which, in the summer time, it effloresces in the form of a fine powder, to the depth of two or three inches. — *Franklin's Journey to the Polar Sea*, 4to. p. 506. *Appendix.* Captain Hall also relates, that the valley of Copiapo, on the coast of Chili, is covered with a layer of sulphate of soda, several inches thick. The salt looks like snow upon the ground. — *Journ. in South America*, vol. ii. p. 22.

[2] The salt spring of Luneberg yields 75,600 gallons of brine in twenty-four hours, of which $\frac{1}{4}$th is saline matter, making the annual produce 55,000,000 lbs. of salt.—*Kirwan's Geo. Essays*, p. 392.

[3] These lakes are generally dry in the summer, being formed by the small streams from the hills settling in the valleys, and dissolving the salt of the soil. There is a lake or valley of this description eighteen miles from Aleppo, called in Arabic *Subkhet al Jibool*, or Valley of Salt, in which the salt is found, in the summer, crystallized from half an inch to two inches thick.— *Russell's Aleppo*, 2d edit. i. 55.

the surface of the ground [1], or rising from it into mountains [2]; and to its presence, also, the ocean owes its saltness. [3] In all these situations, however, it is generally mixed with earths and other matters, and therefore must undergo several processes to bring it to the degree of purity in which it occurs as an article of commerce.

In Cheshire, where the greater part of the salt used in this country is made, the brine is pumped up from very deep wells, and evaporated in wrought-iron pans, which are generally about twenty or thirty feet long and broad, and nine or twelve inches deep; strongly set in masonry over a large furnace, from which flues proceed under every part of the pan. They are protected from the weather by light pyramidal roofs of boards, sufficiently open, however, to admit of the escape of the steam from the boiling brine. When the brine attains the temperature of 100° Fahrenheit, it grows turbid, and carbonate of lime and of iron are separated. These are partly taken off by skimming, but much of the mass falls to the bottom, and cannot be removed until the first deposition of crystallized salt gives it a sufficient body to enable the workmen to rake it out. After this is carefully done, the evaporation is continued at a boiling heat, when the salt gradually forms, and falls to the bottom of the pan in beautifully white, delicate crystals, which are fished out, as they collect, with wooden vessels, and poured into large wooden, hollow cones, having a hole at the apex, which is undermost. When the salt is sufficiently drained, the cones filled with it are taken to a large room heated by stoves, where they remain until thoroughly dry. [4] In warm climates, the sea-water is evaporated in shallow ponds by the heat of the sun; and in this mode what is denominated bay-salt is made; but in colder countries the evaporation is carried on by artificial heat, in a way similar to the Cheshire process. The crystals of the salt procured by these means are more perfect and pure the more slowly the evaporation is conducted. Salt is made in this manner at Lymington, in Hampshire. Many improved processes have been invented for making culinary salt. [5]

The common salt of commerce contains small portions of chloride of magnesium, chloride of calcium, and sulphate of lime. To

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[1] The stratum of rock-salt in Cheshire is 50 feet thick. The salt-mine of Wiliska, near Cracow in Poland, is 6691 feet long, 1115 feet broad, and 743 feet deep. — *Coxe's Travels*, i. 197.

[2] Near Cordova, in Spain, is a mountain of common salt 500 feet high, and nearly three miles in circumference.

[3] The average quantity of salt contained in sea-water varies in different latitudes. Between 10° and 20° south, it amounts to rather more than one-twenty-fourth: between 18° and 34° north, it is rather less than one-twenty-fourth; and at the equator it is nearly one-twenty-fifth. *Thomson's Chemistry*, 4th edit. vol. iv. p. 441.

[4] *Aikin's Dictionary of Chemistry.*

[5] See *Hobart's Engineer and Mechanic's Encyclopædia*, art. Salts.

separate these, the salt is dissolved in four times its weight of pure water, and into the filtered solutions, first, chloride of barium, and then carbonate of soda, are dropped as long as any precipitate falls. The clear fluid, afterwards filtered slowly, is evaporated until the salt, which is pure chloride of sodium, crystallizes. [1]

The following table, drawn up by Dr. Henry, shows the components in the different varieties of salt used in this country : —

100 Parts, by Weight, of the following Salts.		Insoluble Matter.	Chloride of Calcium.	Chloride of Magnesium.	Total earthy Chlorides.	Sulphate of Lime.	Sulphate of Magnesia.	Total Sulphates.	Total Chlorides.	Pure Chloride of Sodium.
For Bay Salt.	St. Ube's[2] - - -	9	trace	3	3	23½	4½	28	—	960
	St. Martin's - - -	12	do.	3½	3½	19	6	25	—	959½
	Olevon - - - -	10	do.	2	2	19½	4½	23¾	—	964¼
Brit. Salt from Sea-water.	Scotch (common) - -	4	—	28	28	15	17½	32½	—	935½
	Scotch (Sunday) - -	1	—	11½	11½	12	4½	16½	—	971
	Lymington (common) -	2	—	11	11	15	35	50	—	937
	Lymington (cut) - -	1	—	5	5	1	5	6	—	988
Cheshire Salt.	Crushed Rock - - -	10	$0\cdot\frac{1}{16}$	$0\cdot\frac{3}{16}$	0¼	6½	—	6½	—	983¼
	Fishery - - - -	1	0·¾	0·¾	1	11¼	—	11¼	—	986¾
	Common - - -	1	0·¾	0·¾	1	14½	—	14½	—	983½
	Stoved - - - -	1	0·¾	0·¾	1	15½	—	15½	—	982½

Qualities.—Pure chloride of sodium is inodorous: its taste is agreeable, and strictly salt; and, when pure, it is perfectly devoid of any degree of bitterness. It is in regular cubes [3], which contain no water of crystallization, and are not affected by exposure to the atmosphere. When it deliquesces, it contains chloride of magnesium. Its crystals decrepitate [4] when heated, and melt in a red heat, losing about two per cent. of their weight; and, in a still greater heat, the salt is volatilised undecomposed in white fumes. Its specific gravity is 2·126. It is nearly equally soluble in cold and in hot water; rather more than two and a half parts of either

[1] *Thomson's Chemistry*, 4th edit. ii. 337.

[2] M. Berthier's analysis differs from that of Dr. Henry. From two specimens he obtained the following results :—Chloride of sodium, ·884 ; sulphate of magnesia, ·076 ; sulphate of lime, ·010; water and oil, ·030 ; with a minute portion of sulphate of soda, in 1000 parts. —*Annales des Mines*, xiii. p. 225.

[3] When the salt crystallizes in urine, it assumes the octahedral form.

[4] Decrepitation is produced in two ways: 1. By expansion of the surfaces of crystals that are bad conductors of caloric — namely those of Chloride of Sodium, Sulphate of Potassa, Iodide of Potassium: 2. By giving out aëriform products — such as occur in Bicyanide of Mercury, Tartar Emetic, Bitartrate of Potassa, Acetate of Copper, Nitrate of Baryta.

being required to dissolve one of salt.[1] It is insoluble in pure alcohol. It consists of 1 eq. of sodium + 1 of chlorine. Formula Na Cl. The crystals contain no combined water. It is decomposed by sulphuric acid.

Medical properties and uses. — This salt is tonic and anthelmintic in moderate doses, emetic and purgative in larger, and externally stimulant. In the ordinary mode of using it, the tonic power of the salt operates in assisting the process of digestion; and, consequently, taken more freely, it proves useful in dyspepsia, and in correcting the weakened state of the intestines, which favours the propagation of worms. In the Russian army the soldiers get money to buy salt, but often spend it in drink instead of salt; the consequence of which is a state of habit similar to scurvy. It is cured by salt. In large doses it is said to check vomiting of blood, and may be used as a purgative, although it is seldom employed.[2] As a local stimulant, its solution in tepid water, in the proportion of ℥ ss. or ℥ j. to O j. of water, forms the common domestic enema. It is used also as a fomentation to sprained and bruised parts; and, dissolved in a large proportion of water, it forms the best stimulant general bath, whether used cold, or in a tepid, or in a hot state. To act as a tonic, the dose of chloride of sodium may be from grs. x. to ʒ j.; as an emetic, ℥ jss. dissolved in O j. of water; and to operate by stool, from ℥ ss. to ℥ j. is necessary. It should be largely diluted.

SOLANUM. *Spec. Plant. Willd.* i. 1025.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Solanaceæ.

G. 383. *Corolla* wheel-shaped. *Anthers* slightly coalescing, opening by two pores at the apex. *Berry* two-celled.

* *Unarmed.*

Species 15. S. *Dulcamara.*[3] Woody Nightshade, or Bitter-sweet. *Med. Bot. 3d edit.* 240. *t.* 85. *Smith, Flora Brit.* 256. *Eng. Bot.* 565. *Hayne*, ii. 390.

Officinal. DULCAMARA, *Lond. Edin. Dub.* The stalks of Bitter-sweet. The new shoots or twigs.

Syn. Douce amère (*F.*), Bittersus stangel (*G.*), Bitterzoit (*Dutch*), Bittersöde (*Dan.*), Quesved (*Swed.*), Psinki Wodne (*Pol.*), Dulcamara Salatro (*I.*), Amaradulcis (*S.*), Dolçamarga (*Port.*), Solotucha Elsterbeeren (*Russ.*).

This species of Solanum is an indigenous shrub, growing in

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[1] The following appears to be the solubility of chloride of sodium: —

100 parts of water at	13·89° centigrade dissolve	35·81 parts of the chloride.	
	16·90	35·88	
	59·93	37·14	
	109·73	40·38	*Ure, Chem. Dict.*

[2] The purgative property of sea-water does not altogether depend on this salt, as it contains a large proportion of chloride of magnesium, which is purgative.

[3] *Citocatia* of the monastic age.

hedges and shaded spots, and flowering in June and July. The root is ligneous: the stem woody, roundish, branched, and climbing sometimes to the height or six or eight feet: the leaves are alternate, on footstalks, entire, smooth, soft, about two inches long and one broad, and of a dull-green colour; the lowermost cordate and undivided, and the uppermost halberd-shaped. The flowers are in elegant clusters opposite to the leaves, or terminal, drooping, and having the semblance, but not the structure, of a true cyme: each consisting of a small purplish calyx with blunt segments: a corolla of five reflected, equally divided, pointed, bright violet-coloured segments, with two green dots at the base, and a longitudinal deeper purple vein through the centre of each segment; and large, erect, almost sessile, lemon-yellow anthers: the berries, which ripen in September and October, are oval, scarlet, very juicy, bitter, and poisonous.[1]

The extreme twigs are the parts employed. They should be gathered in autumn, as at that season they are more powerful; depending perhaps on their being less succulent, and containing more of the peculiar secretion on which the virtues of the plant depend. The soil in which the plant grows also affects its medicinal powers. That grown on a high and dry situation is the best.

Qualities. — The fresh twigs have a peculiar odour, but the dried are inodorous. They have a slightly bitter taste, followed by a sweetness not unlike that of liquorice root, depending probably on an uncrystallizable sugar, with a slight degree of acrimony. Boiling water extracts all their active matter. Scheeler found that they contain citric acid. Their medicinal properties depend on an alkaline principle, which was first procured by M. Desfosses of Besançon, and is contained in the dulcamara in combination with malic acid: it is termed *solanine* or *solania.* It occurs in white acicular crystals, inodorous, and slightly bitter; has an alkaline reaction, and forms neutral salts with acids. It is easily prepared by precipitating the juice of the berries of the garden night-shade, Solanum *nigrum,* by ammonia; drying this precipitate, and treating it with boiling alcohol. The alkaloid is deposited as the spirit cools. It is scarcely soluble in water, but very soluble in alcohol, but little so in ether.[2] According to Pfaff, the twigs of Solanum *dulcamara* contain *solania, picroglycion, vegeto-animal matter, gummy extractive, starch, salts,* and *lignin.*[3] Pfaff obtained a principle which he termed *picroglycion,* or bitter-sweet, owing to its taste; fusible, soluble in water and alcohol;

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[1] They excite violent vomiting and purging.

[2] Solania can also be procured from the shoots of the potato.

[3] *Syst de Mat. Med.* Bd. vi. § 506.

and not precipitated from these solutions by infusion of galls, nor metallic salts.

The Editor has found that but little *Solania* is contained either in the twigs or juice of the fruit of the Solanum Dulcamara; he finds, however, a large quantity of matter precipitated by tannin, and which seems to give the bitter-sweet taste to the plant. The composition of *Solania* is represented by the formula $C_{84}\ H_{68}\ N\ O_{28}$.

Solania differs much from Atropia in its properties; it does not dilate the pupil, this the Editor can assert from experience; it is stated to be poisonous, and to kill rabbits in doses from one to four grains, causing paralysis of the hind legs, coma, &c.

Medical properties and uses. — Bitter-sweet is diaphoretic, diuretic, according as the surface is kept warm or cool; it is also narcotic. It has been found useful in humoral asthma, dropsy, chronic rheumatism, and in lepra vulgaris and alphos, scabies, and pityriasis. Willan[1] remarks, that it is not applicable for the cure of lepra nigricans: we can assert that it is not of the least use in acute rheumatism; and we believe of as little in fluor albus and suppression of the menses, in which it has been strongly recommended. When given in too large doses at first, it occasions nausea, vomiting, syncope, violent palpitation, and convulsive twitchings in the eyelids, the lips, and the hands. It therefore requires to be begun with small doses; and even when it is more cautiously administered, if these symptoms occur, the dose must be lessened, and some aromatic conjoined. The usual form under which it is used is that of watery infusion or decoction; but it may be also given in substance pulverised. The dose of the powder may be from x. to xxx. grains, taken in a cupful of milk.

The Editor has recently had some experience of the action of this drug; he finds that the berries are by no means poisonous, even in large doses, one patient having taken half a pound of the berries daily for some time; and the same individual also took as much as was equivalent in strength to three or four pints per diem of the decoction of the twigs. The only effect produced was an amelioration and removal of the symptoms of the disease (Psoriasis) under which she was labouring. The use of the drug in large doses appeared to restore the skin to its healthy condition, although the whole surface had been affected by the disease for upwards of six years.

Officinal preparation.—*Decoctum Dulcamaræ,* L. E. D.

SPARTIUM. See *Cytisus.*

[1] *Description and Treatment of Cutaneous Diseases,* 147.

SPIGELIA. *Spec. Plant. Willd.* i. 824.[1]

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Loganiaceæ.
G. 308. *Corolla* funnel-shaped. *Capsules* twin, two-celled, many-seeded.
Species 2. S. *Marilandica.* Perennial worm-grass. *Med. Bot. 3d edit.* 178. *t.* 69. *Edin. Phil. Trans.* iii. 151. *t.* 1. *Roque,* 75.
Officinal. SPIGELIA, *Edin.* Root of Carolina pink.

Syn. Spigelie de Maryland Brinailler (*F.*), Spigelie (*G.*), Spigelia (*I.*).

This is a perennial plant, a native of the warmer parts of North America, where it is termed *Carolina pink;* flowering in July and August.[2] The stems are annual, simple, erect, rough, quadrangular, and rigid; and about seven or eight inches in height. The leaves are opposite, sessile, ovato-lanceolate, quite entire, smooth, and spreading. The flowers are in a solitary spike, with small opposite bracts; the calyx consists of five awl-shaped, persistent leaflets; the corolla is of a bright-red colour on the outside, and deep orange within, pentangular above, gibbous at the throat, widening at the base; with the border five-parted: the segments being lanceolate and revolute: the stamens are five, shorter than the corolla, supporting sagittate, converging anthers; the germen is superior, with a round style, jointed below, with the upper part deciduous; the seeds are angular and rugged.

Qualities. — Spigelia root has a bitter taste, which is imparted to boiling water. Feneuille says its active principle resembles the purgative principle contained in some leguminous plants. The root is most active in the recent state; and, according to Wackenroder, the plant contains *myrisin resin with chlorophylle, a peculiar resin, tannin, lignin, malate of potassa, chloride of potassium,* and *malate of lime:* the root—*fixed oil, acrid resin, tannin, bitter acrid extractive* and *lignin.*

Medical properties and uses. — This root is purgative, narcotic, and anthelmintic. Its anthelmintic virtues were discovered by the Cherokee Indians, to whom it is known under the name of *unsteetla;* and many opportunities of proving its efficacy in worm cases have occurred both in America and this country. When in the recent state, and given in small doses, it occasionally produces giddiness, dimness of sight, and even convulsions; effects which are attributed to a narcotic principle it possesses, but which its powerful cathartic property prevents from acting when the dose is large. It is usual to administer an emetic previous to the use of it, and to aid its purgative operation by the addition of two or three grains of calomel, or eight or ten of rhubarb. It has been

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[1] The genus was named after Adrian Spigelius, a celebrated professor of anatomy at Padua.
[2] It was first cultivated in England in 1694, by Bobart.

found most powerful in expelling lumbrici; and its vinous infusion is said to have been found useful in intermittents. Dr. Barton recommends it in the protracted remittent fever of infants, which often lays the foundation of hydrocephalus. Spigelia root may be administered either in substance or in the form of aqueous infusion. The dose of the pulverised root is from grs. x. to ℨ j., given every night and morning until the worms are expelled.

SPIRITUS PYROXILICUS. *Dub.*

PYROXILIC SPIRIT. Wood Naptha. Medicinal Naptha. Wood Spirit.

Syn. Esprit de Bois, Alcool mythelique (*F.*).

This preparation, which is now made officinal by Dublin College, is one of the products resulting from the decomposition of wood; it occurs, therefore, along with tar, acetic acid, &c.

The heavier portion of the distilled liquor, which contains the acid and pyroxilic spirit, is neutralised by lime, and redistilled. The pyroxilic spirit comes over, containing, however, small quantities of acetone and aldehyde; from these it is separated by distillation with chloride of calcium, which unites with the wood spirit and allows the acetone, &c. to pass over. By adding water afterwards to the chloride of calcium, and redistilling, the pyroxilic spirit is obtained.

Qualities.— When pure it occurs as a colourless fluid, with an agreeable aromatic, spirituous, or ethereal odour; but, as met with in commerce, it has a peculiar empyreuma: it is very volatile, burning with a pale flame, and emits no smoke; it unites readily with water, alcohol, and ether in all proportions. It is a powerful solvent of resinous substances. Its specific gravity according to the Dublin College is 0·846, according to Regnault, 0·798; it boils at 140° Fahr. It is the alcohol of the methyle series, or a hydrate of the oxide of methyle, and its composition is represented by the formula $C_2 H_3 O + HO$. The Dublin preparation, having the sp. gr. 0·846, is mixed with other ingredients. Mr. Morson states, that when united with a large excess of water an oily fluid separates, which being removed, a much purer body can be obtained by redistillation.

Medical properties and uses.—Dr. Hastings first introduced wood spirit into medicine as a remedy for phthisis: subsequent experience has not established its value in this affection; it appears, however, to act beneficially in some cases, in allaying the troublesome cough, and diminishing excessive expectoration. Dr. Neligan[1] considers that it acts as a sedative, and states that "the harassing cough and troublesome vomiting, so frequent an attendant of the

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[1] *Neligan on Medicines*, 3d edit.

advanced stages of consumption, being more relieved by it than by any other remedy I have employed." Dr. Christison has found it useful in allaying chronic vomiting.

Dose. — M. v. to mxxx. three times a day, mixed with water, or added to any mixture.

SPIRITUS RECTIFICATUS, *Lond. Edin. Dub.* Rectified Spirit. Diluted Alcohol.

Syn. Eau de Vie rectifié, Esprit de Vin (*F.*), Rectifizirter Weingeist (*G.*), Acqua-vite rettificata, Spirito di Vino (*I.*), Agua ardiente (*S.*), Vinnoe Spirt (*Russ.*).

This is alcohol in that moderate degree of concentration in which it can be easily prepared in the large way for the purposes of trade. The London College states its specific gravity to be to that of water as 838 to 1000; the Edinburgh 838 (56 over proof[1]); and the Dublin College 840; but at the strength at which it is procured from the rectifiers it varies from 54 to 60, or occasionally 64 over proof.

All substances which have undergone the vinous fermentation contain alcohol ready formed, but usually combined with colouring matter, extractive, other principles, and water; and are capable of affording it by distillation. The first distillation of wines and fermented liquors afford ardent spirits, such as brandy, rum, arrack, whisky, and gin.[2] These are all mixtures of alcohol, water, and a little volatile oil or resin, which give them their characteristic flavour and colour, and the quantity and nature of which constitute the sole difference in ardent spirits. It is from the re-distillation or rectification of these that rectified spirit is produced.

The process of rectification is exceedingly simple. Any quantity of brandy, malt, spirits, or rum, is diluted with an equal portion of water, and put into an alembic or still, to which a refrigeratory is united, and distilled with or without the addition of impure carbonate of potassa, with a very gentle heat. The first product is the strongest and purest, and, when it has come over to

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[1] The meaning of this term is, that the number stated implies that that quantity of water in volumes is required to be added to one hundred volumes of the spirit, to reduce it to proof of 920 — the density of the proof spirit of the British Excise scale.

[2] We have no historical record of the period when the distillation of spirit was invented: the Greeks and Romans were ignorant of ardent spirits; but the use of the still was well known in the time of Geber, who lived in the seventh century, who describes very accurately the process of distillation by the alembics *per descensorium et filtrum*, in his work, entitled *Liber Investigationis Magisterii.* The first spirit known in Europe was made from grapes, and sold as a medicine both in Italy and Spain, under the name of *Alcohol.* The Genoese afterwards prepared it from grain; and sold it in small bottles at a very high price, under the name of *Aqua Vitæ.* — Vide *Morewood's Essay on Inebriating Liquors.*

the amount of one-fourth of the whole contents of the still, forms the rectified spirit. If the distillation be continued, the spirit continues to come over colourless, but weaker and weaker, till at length it is so watery as not to be inflammable. What remains in the alembic is water, the colouring ingredients, and any accidental impurities. When the ardent spirits which have been employed contain much oil the distillation requires to be repeated, and generally with the addition of alkali, lime, or other articles, before the empyreumatic flavour can be completely destroyed.[1] When alkali is used, the spirit has a urinous taste; to free it from which it is re-distilled, with the addition of a little alum and charcoal, the acid of the former of which attracts the small portion of alkali, which the spirit held in solution. Malt spirits, when properly rectified, yield as pure and as strong rectified spirit as brandy.[2]

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[1] This depends on a *volatile oil*, the product of the distillation, which is termed *corn-spirit oil*, in this country, and *Fusselöl* by the Germans. Dr. Pereira says that Messrs. Bowerbank informed him that they procured one gallon of it from 500 gallons of spirit. This oil is now officinal in the Dublin Pharmacopœia under the name of alcohol, Amylicum or Fousel oil. See Part III.

[2] Besides those spirits which are distilled from wines, grain, and fruits, and the other articles mentioned in the Table, page 753., the Afghans make also an intoxicating liquor from ewe's milk; and at Kamschatka a powerfully inebriating liquor is prepared from a species of mushroom, named Muchumer.

Table of the different Kinds of Spirits.

Names.	Materials from which they are distilled.	Countries producing them.
Agua ardiente	Pulque, the fermented juice of the Agave	Mexico.
Arrack	Coarse palm sugar, named jaggery, fermented with the bark of the Mimosa *leucophlea*; also from rice and the fermented juice of the Palm	India.
Var. Mahwah Arrack	Flowers of the Madhuca tree, Bassia *butyracea*	India.
Tuba	Palm wine	Philippine Islands.
Araka	Koumis, fermented mare's milk	Tartary.
Araki	Dates	Egypt.[1]
Arika	Fermented cow's milk, a variety of Koumis	Tartary, Iceland.
Brandy[2]	Wine, figs, peaches, Persiman apple, mulberries, and sometimes other fruits	Europe, Asia, N. & S. America; where-ever wine is made.
Var. Lau	Rice	Siam.
Rakia	Husks of grapes, mixed with aromatics	Dalmatia.
Rossolio	A compound of brandy, Ros-solis, and other plants	Dantzic.
Troster	Husks of grapes, fermented with barley and rye	On the Rhine.
Sekis-kayavodka	Lees of wine and fruit	Scio.
Geneva[3] Hollands	Malted barley and rye, rectified on Juniper berries	Holland.
Var. Gin[4]	Malted barley, rye, potatoes; rectified with turpentine	England.
Goldwasser	Wheat, barley, and rye, rectified with aniseeds, cinnamon, and other spices	Dantzic.
Kirchwasser	Machaleb cherry	Switzerland.
Maraschino	Macarska cherry	Zara, capital of Dalmatia.
Rum[5]	Cane sugar and molasses	West Indies and S. America.
	Maple sugar	North America.
Var. Slatkaia trava	A sweet grass	Kamschatka.
Show-choo	The lees of Mandarin, a wine made from boiled rice	China.
Whisky[6]	Malted and raw barley, rye, oats, and potatoes	Scotland & Ireland.
———	Sloes	South of France.
Y-wer-a	The root of the Teeroot, baked, pounded, and fermented	Sandwich Islands.
Vino meresel	Distilled from Pulque, the fermented juice of the Agave *Americana*	Mexico.

[1] Herodotus mentions date spirit as an article of commerce in Babylonia.

[2] The best brandy is that of Cognac, the next of Bordeaux and Rochelle.

[3] Named from *genèvre*, the French for juniper.

[4] The quantity made in England annually exceeds 3,000,000 gallons.

[5] The appellation rum is supposed to be derived from the terminal syllable of the word *saccharum*; but the native Americans call this liquor rum.

[6] 2,499,880 gallons were distilled in Scotland, in 1822; 1,341,978 gallons of which were sent to England, unrectified, for making gin and compounds. In the same year

The strength of spirits, or the quantity of alcohol they contain, is ascertained by several methods. The taste and the degree of frothiness or size of the bubbles formed when spirit is shaken in a phial, is the least correct method; and the burning the spirit, and observing the quantity of water which remains after the combustion, although more accurate, is liable also to error from the impossibility of performing the experiment always under the same circumstances. Pure alcohol[1] leaves no water: rectified spirit of moderate strength, 25 per cent.; French brandy, 56; and common malt liquor, 65; and the like. Another test is the pouring some of the spirit on gunpowder and setting fire to it; but this is also very incorrect, and indicates two degrees of strength only; that which fires gunpowder, and that which cannot fire it. A more accurate test than any of these, for common purposes, is to shake the spirit in a phial, with very dry, pure carbonate of potassa, and observe the quantity of water attracted by the alkali, which indicates the strength of the spirit. But the only certain mode of ascertaining the relative strength of spirits is by determining the specific gravity of the spirit at a given temperature.[2] Thus at 60° Fahrenheit, the specific gravity of rectified spirit is ·835, at 65° it is ·83362, and at 70° the gravity of the same spirit is ·83124; while the gravity of the proof spirit of the London College at the same degrees of temperature is ·920, ·92794, and ·92580 (see Table under the article *Alcohol* among the Preparations); the weakest spirit having the greatest specific gravity, and this diminishing as the temperature increases.[3] The usual mode of ascertaining the relative gravity of different spirits is by the hydrometer[4], of which there are different kinds in use; but *Sikes*' is that which is usually employed in this country. For ordinary purposes, the relative strength of spirits may be known by weighing the sample to be tried in a phial capable of holding exactly 500 grains of distilled water. An equal bulk of rectified spirit weighs 418 grains, and of proof spirit 465: hence the number of grains above or below these sums will indicate the relative strength of the spirit.

Qualities. — Pure rectified spirit has a fragrant odour, and a hot,

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the quantity made in Ireland was 4,318,012 gallons. The name *whisky* is supposed to be derived from *usque*, the two first syllables of *usquebaugh*, the name it originally had in Ireland, whence the Scots appear to have derived their knowledge of it. In Ireland it was also called *buil-ceaun*, which literally signifies *madness of the head.* The best Scotch whisky is *Glenlivet;* the best Irish, *Ennishowen.*

[1] By the term *pure* or *absolute alcohol* is meant alcohol of a specific gravity of ·796 at 60° Fahrenheit, the strongest which can be procured.

[2] The temperature at which the specific gravity of spirits is determined by the Excise is 62°.

[3] Five pints of rectified spirit are reduced to proof spirit by the addition of three pints of distilled water at a temperature of 62°.

[4] For a description of this instrument, see Part I.

highly pungent taste. It is colourless; always fluid; cannot be congealed at any known degree of cold; evaporates speedily at the ordinary temperature of the atmosphere; boils at 163° Fahrenheit; and is extremely inflammable, burning with a blue, lambent flame, without any sensible smoke. It should have no acid reaction, and should evaporate without any residue. When not wholly free from oil of corn, strong sulphuric acid gives it a reddish tinge; and it is, also, reddened by nitrate of silver, when exposed to the light, and a black powder is thrown down. Like alcohol, it combines with water in every proportion, and is not rendered turbid by it; and on account of its affinity for water, it precipitates many of the neutral salts from their aqueous solutions. It is capable of dissolving many saline bodies, and is the proper solvent of the greater number of the proximate principles of vegetables: its constituents are 85 of pure alcohol and 15 of water in 100 parts, when its specific gravity is ·838, at a temperature of 60° of Fahrenheit; but 83 only of pure alcohol, and 17 of water, when it is ·840, as designated by the Dublin College.

According to the London College, this spirit does not become turbid with water, nor is it reddened by sulphuric acid: and it may be reduced to the weaker spirit, by adding to every five pints, three pints of distilled water at a temperature of 62° Fahr.

The Edinburgh College state that 4 fluid ounces treated with 25 minnims of their solution of nitrate of silver, exposed to a bright light for 24 hours and then passed through a filter purified by weak nitric acid, so as to separate the black powder which forms, undergo no farther change when again exposed to light with more of the test.

Medical properties and uses.—Rectified spirit is a very powerful stimulant. When it is applied to the surface and evaporation prevented, it reddens the skin, causes pains and condensation of the tissue of the part. When taken into the stomach undiluted, it operates as an irritant poison. As a topical application it has been found useful, when united with an equal volume of white of egg, in excoriations from pressure in fevers, and other debilitating diseases. In its undiluted state it is never exhibited as a remedy; and is employed only for forming the diluted spirit, and as a pharmaceutical agent.

Rectified spirit is made use of in preparing some of the spirits, essences, and tinctures of the different Pharmacopœias.

SPIRITUS TENUIOR. *Lond.* Weaker spirit. Alcohol more dilute. Proof spirit. A preparation in the Edinburgh and Dublin Pharmacopœias.

This is usually prepared from rectified spirit diluted with a certain proportion of water. According to the London College, its

specific gravity should be to that of distilled water as 920 to 1000, at 60° Fahr.; the Dublin College states it at 920; while the Edinburgh College orders it of the gravity of 912 (7 over proof). The spirit of the London College may be formed by mixing five parts, by measure, of rectified spirit with three of water; and contains 44 parts of pure alcohol and 56 of water in 100 parts: the proportions ordered by the Edinburgh and Dublin Colleges will be found in Part III. But very frequently, instead of being formed by mixing the pure rectified spirit with water, an impure spirit of a strength nearly similar is employed. The qualities of the diluted spirit are not different from those of the rectified spirit, except in degree; and in some instances it is better fitted for taking up the principles of vegetables submitted to its action. It is a curious fact, that diluted spirits, preserved in vessels covered with bladder only, become stronger: a circumstance that appears to depend on the solvent powers of the aqueous vapour acting on the bladder, and relaxing its pores, so as to escape through them; while those of the alcohol, having the power of coagulating gelatin and animal albumen, tend to close their pores, and are consequently detained.

Medical properties and uses.—Rectified spirit diluted to the degree of proof spirit is still a very powerful diffusible stimulant, and too strong for internal use. It displays at first an excitant and astringent action, followed by a secondary sedative effect. Its astringent influence is displayed in the corrugation of the skin, and its coagulation of the blood, so as to form a clot in hæmorrhages, and arrest the bleeding. Its secondary sedative influence is demonstrated in the depression and collapse which follow intoxication. Externally applied, it is recommended in burns; to restrain bleeding in passive hæmorrhages; and as a friction or fomentation to relieve muscular pain; and in a largely diluted state it forms a good collyrium in the last stage of opthalmia. In cases of retention of the urine owing to paralysis of the bladder, bathing the hypogastric region with rectified spirit has been found beneficial. Proof spirit diluted with water is employed as a remedy in the form of tinctures and spirits; and the ardent spirits in common use may be regarded as nearly of the same nature. These, taken in moderation, increase the general excitement, communicate additional energy to the muscular fibres, strengthen the stomach, and exhilarate the mind. Hence they are often and advantageously used in cases of debility and the low stage of typhoid fevers, in which the use of wine is indicated; and, in habits disposed to create acidity, they are even preferable to wine; some of them, particularly brandy, proving gratefully stomachic, when wine is nauseated and rejected. As an article, however, of daily or dietetical use, particularly if taken in immoderate doses or long continued, ardent spirits, besides being the source

of much moral evil, and debasing the human character nearly to a level with that of brutes, occasion disease, and are commonly the origin of dyspepsia, hypochondriasis, and hepatic and visceral obstructions. The hurtful effects of ardent spirits, however, are obviated, in a considerable degree, by diluting them largely with water, and adding lemon-juice and sugar to the mixture, so as to form what is generally known by the name of punch. Although all the varieties of ardent spirits may be regarded as diluted alcohol, yet each has a peculiarity of operation: thus, *brandy* is simply cordial and stomachic; *rum* heating and sudorific; *gin* and *whisky* are diuretic; and *arrack* is styptic, heating, and narcotic, and ill-adapted to European constitutions.

It is used in the preparation of all the tinctures except those which are prepared with rectified spirit; and of some of the spirits.

SPIRITUS VINI GALLICI, *Lond.* Brandy.

Brandy is procured by the distillation of wine and, except in slight shades of flavour, is nearly the same whatever wine is employed to yield it. The best of the French brandies is the *Cognac,* which has an agreeble, vinous, somewhat ethereal, aromatic odour, and a warm pungent taste. Good Brandy is at first nearly colourless; but it acquires a straw-colour after it has been kept for some time in the cask. The deeply-coloured brandy, common in this country, is artificially coloured by burnt sugar, which, also, changes the flavour of the spirit; and, it is said, mellows it. Good French brandy, as it is imported, is usually above proof; but if it be kept in the wood its strength is diminished. Its sp. gr. is from 0·902 to 0·941 [1]: but, according to Mr. Brande, 100 parts of brandy contain 53·39 of alcohol, sp. gr. 0·825.

The constituents of brandy are *alcohol, water, volatile oil,* a trace of *acetic acid,* a small proportion of *acetic ether, œnanthic ether, colouring matter,* and *tannic acid.* Brandy is imitated by various compositions; and these compounds are often sold as French brandy.

Medical properties and uses. — Brandy is a useful excitant, and frequently prescribed for its cordial properties; but it is too indiscriminately employed.

Officinal preparation.—*Mistura Spiritus Vini Gallici,* L.

SPONGIA. *Syst. Nat. Gmelin,* vi. 3817.

D. 4. *Cl.* 4. Zoophyta. *Ord.* 4. Polypi. *Cuvier.*
G. 343. A flexile, fixed, torpid, polymorphous *animal,* composed either of reticulate fibres, or masses of small spires interwoven together, and

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[1] Soubeiran, *Nouveau Traitè de Pharm.* 2d edit. i. 142.

clothed with a gelatinous flesh full of small mouths on its surface, by which it absorbs and ejects water.

Species 8. S. *officinalis.* Officinal Sponge. *Phil. Trans.* lv. 283. *t.* 10.

Officinal. SPONGIA OFFICINALIS, *Edin.* Sponge.

Syn. Eponge (*F.*), Meerschwamm, Saugschwamm (*G.*), Spongie (*Dutch*), Svamp (*Dan.*, *Swed.*), Spugna (*I.*), Esponja (*S.*, *Port.*), Bodiaga (*Rus.*), Isfunj (*Arab.*), Moābādul (*H.*), Abeermoordele (*Pers.*), Uniwatta (*Jap.*).

This species of sponge is found chiefly in the Mediterranean and Red Seas. In some of the islands of the Archipelago the inhabitants are trained from infancy to dive for sponges, which are generally found attached to the bottom of the rocks. Although the ancients had perceived something like sensation in sponges by their shrinking, they were long supposed by them to be of a vegetable nature, from their texture and the branched appearance which they assume; but Mr. Ellis's observations[1], and more lately those of Mr. J. S. Bowerbank[2], have established the fact that they are animals *sui generis.* It derives its nutriment from the water in which it lives, taking it in through the superficial pores, and expelling it by the fœcal orifices or vents opening on the surface. Spicula, or minute spines or points, exist in the sponges of commerce. According to Mr. J. S. Bowerbank, they are imbedded in the substance of the fibre, and are mostly to be observed in the larger flattened portions of the fibre, and not in the finer anastomosing threads. The tubes are filled with a gelatinous matter, and often with minute shells and sand.

Qualities. — There are two kinds known in British commerce, one from the Archipelago imported from Smyrna, and known as *Turkey sponge.* It is in the form of cups or funnels, and is the most esteemed. The other, or *West Indian sponge,* is more or less convex, with projecting lobes. It is coarser, and much less esteemed than the Turkey sponge. Sponge cleaned and rendered fit for use is of a brownish-yellow colour, soft, light, and very porous; absorbing rapidly by capillary attraction as much as it can contain of any fluid in which it is immersed, and again yielding it up on being compressed. When sponge is digested with boiling distilled water, it yields up to it a considerable proportion of gelatin, and the sponge loses much of its flexibility, and crumbles between the fingers when dry. Boiled with potassa it forms a soap. Its principal constituents, according to the analysis of Mr. Hatchet, are animal *gelatin, albumen,* a small portion of *common salt,* and some *carbonate of lime;* and to these we may add *iodine, bromine, sulphur, silica, alumina,* and *magnesia.*[3] Iodine is present as a constituent in burnt sponge.

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[1] *Phil. Trans.* lv. 284. [2] *Microscopic Journ.* i. 8.

[3] Hornemann, *Berl. Jarl.* Bd. xxx. Abr. ii.

Medical properties and uses. — Sponge, in its usual form, is never employed as a remedy; but is an exceedingly useful instrument in the practice of surgery. Burnt sponge is not now officinal.

STALAGMITES. *Spec. Plant. Willd.* iv. 980.

Cl. 23. *Ord.* 1. Polygamia Monœcia. *Nat. ord.* Guttiferæ.

G. 1888. *Hermaph.* *Calyx* four-leaved. *Corolla* four-petalled. *Stamens* thirty, inserted into a fleshy four-angled receptacle. *Style* thick. *Stigma* four-lobed. *Berry* one-celled, crowned by the style, three-seeded.

——— *Male.* *Calyx, Corolla,* and *Stamens* hermaphrodite.

Sp. 1. S. *Cambogioides.* The Gamboge-tree. *Murray, App. Med.* iv. 645. *Plenck's Icones Plant. Med. t.* 421.[1] Hebradendron Gambogioides. *Graham.*

Officinal. CAMBOGIA, *Lond. Edin. Dub.* Gamboge or Camboge. Gum resin from uncertain species of Garciniæ, *Lond.* C. (Siamensis) Siam Gamboge, probably from a species of Hebradendron; C. (Zeylanica), Ceylon Gamboge, from Hebradendron Cambogioides, *Edin.* Gum Resin, from Hebradendron Gambogioides, *Dub.*

Syn. Gomme Gutte (*F.*), Gummigutt (*G.*), Guttagum (*Dutch*), Gummi Gutta (*Swed.*), Gomma Gotta (*I.*), Guta Gamba (*S.*), Rom (*Port.*), Ossāra réwūnd (*Arab.*), Gokatu (*Cing.*), Mukki (*Tam.*).

This tree has been erroneously supposed to yield this gum-resin. It is a native of the kingdom of Siam, and it is, also, asserted of Ceylon, where it is known by the names *Ghokata* or *Gokkata*, or *Gohlatha.* The name Camboge is derived from Kamboja, a river in Siam, on the banks of which this gum is said to be produced in great quantity. Although it was introduced into European practice so early as 1603, yet its real botanical source is still undetermined. On the authority of Professor Graham of Edinburgh, Dr. Christison affirms that there is no such plant as Stalagmites *gambogioides*[2]; and from an examination of specimens of the true camboge tree of Ceylon, sent home by Messrs. Walker, the same botanist has ascertained that the Ceylon camboge is the production of a peculiar species, which must constitute one of a new genus, and he has named it Hebradendron *gambogioides;* but still it is impossible to say that the Siam camboge is furnished by the same tree. No Ceylon camboge is imported into Great Britain, the only kind being that from Siam. It is of various qualities, which are known in the market under the names of *pipe, lump,* and *coarse camboge.* The pipe camboge, as usually imported, is in hollow cylinders, about two inches in diameter, occasionally doubled and cohering; the

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[1] De Candolle says camboge is the produce of Garcinia *cambogia.*

[2] *Dispensatory,* 246.

surface is greenish, and striated, owing to the pieces being moulded in a bamboo, in which it is occasionally inclosed. *Lump camboge* occurs in masses of several pounds weight. It is often intermixed with chips of wood and fragments of twigs. It is very inferior to pipe camboge. *Coarse camboge* is harder, has a more earthy fracture, and is of a paler colour than any of the former kinds It often contains black spots. Iodine detects starch in it, when the decoction is allowed to cool before it is tested.

In Siam the camboge is obtained in drops by breaking the leaves and young shoots; but in Ceylon it is procured from incisions in the bark of the tree, which is wounded with a sharp stone, at the time the flowers should appear. It is collected first in cocoa-nut shells, and thence transferred into large earthen bowls, where it remains until it is nearly dried to a cake, when it is sometimes formed into rolls and wrapped up in leaves. This cylindrical form, however, is owing to its being run into the joints of the bamboo, when it is in a liquid state.[1] Camboge is brought to Europe packed in cases and boxes; it is imported from Singapore and Calcutta.[2]

Qualities.—*Pipe camboge*, both in the hollow and the solid pieces in which it is imported, is externally striated, and of a dull-green or orange-red colour. It is inodorous, and nearly insipid, opaque, brittle, and breaks with a vitreous conchoidal brownish-yellow fracture. Its gravity is 1·221.[3] The powder is a beautiful bright yellow. When heated, it melts; and by increasing the heat burns with a white flame, and leaves a very light, spongy charcoal. Camboge is inodorous, and has scarcely any taste: but it leaves a sensation of acridity in the fauces. When wetted, it stains the fingers a brilliant yellow; and when triturated with water about two thirds are dissolved, and a turbid yellow solution produced. Alcohol, or rectified spirit, dissolves nine parts in ten, sulphuric ether six parts; and both form transparent, deep golden-yellow tinctures. Camboge is, also, soluble in a strong solution of pure ammonia and of potassa, forming deep orange-red solutions.

The *watery solution* of camboge reddens tincture of litmus; is not precipitated by alcohol, but, on the contrary, is rendered transparent by it: persulphate of iron strikes with it a pale olive-brown hue, but causes no precipitate; nor is it affected by solutions of any of the other metallic salts. The *alcoholic tincture* is rendered turbid and bright yellow by the addition of water, but the precipitate is long in being deposited. The ethereal tincture, when evaporated in water, leaves a pellicle of beautiful orange-coloured brittle resin. It amounts to from 60 to 90 per cent. of the camboge: it operates

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[1] *White's Voyage to the China Seas*, Boston, 1823, p. 250.

[2] The Cambogia *gutta* of Linnæus, several species of Hypericum, Chelidonium *laciniatum*, and several other plants, yield a yellow juice.

[3] Brisson.

as a drastic purgative. According to Johnston[1] its formula is $C_{40} H_{23} O_8$. According to Dr. Christison camboge consists of 74·2 of *solid resin*, 21·8 of *soluble gum*, and 4·8 of *water*.[2] The ethereal resin is supposed to be an acid by Johnston, who has termed it *cambogic acid;* and its combination with the alkalies, forming cambogiates, tends to confirm this opinion. It also forms cambogiates with the metallic oxides. It is still undetermined whether this acid is the active principle of camboge. When water is added to the alkaline solutions, they are not even rendered turbid; but, on the addition of acids, yellow precipitates are produced which are soluble in an excess of acid. These experiments confirm the analysis of Braconnot, from which he concluded that camboge contains one part of a *gum* resembling cherry-tree gum, and four of a *brittle resin:* but they do not throw any light on the nature of its cathartic property.

Medical properties and uses. — Camboge is a powerful drastic cathartic; and frequently excites vomiting, even in moderate doses. It appears to operate by its topical action, causing, in large doses, inflammation of the intestinal canal, and even inflammation of the cellular tissue, when it is applied to it. On this account it operates as an errhine. It may be justly regarded as a powerful irritant poison when administered in large doses, namely, from ʒss. to ʒj.[3] It is efficaciously used in obstinate costiveness, in dropsies, and for the expulsion of tæniæ; but, from the violence of its operation, and the griping it occasions, it requires to be exhibited with caution. As a hydragogue it is usually combined with squill and bitartrate of potassa; and for cathartic purposes, with calomel, soap, or rhubarb. The alkaline solution of it has also been administered in dropsy, in which form it is said to operate both by stool and urine.[4]

The dose of the alkaline solution is from ♏ xxx. to ♏ l., in a cupful of water, twice a day. It is, however, more usually given in substance, in the form of pills, in doses of from grs. ij. to grs. vj. variously combined.

Officinal preparation. — *Pilula Cambogiæ composita*, L. *Pilulæ Cambogiæ*, E.

STANNUM.[5] *Edin. Dub.* Κασσιτερον. Tin.

Syn. Etain (*F.*), Zinn (*G.*), Tin (*Dutch*), Tonn (*Dan.*), Tenn (*Swed.*), Cyna

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[1] *Trial of Joseph Webb, at York Assizes*, 1834. [2] *Dispensatory*, 249.

[3] It is said to be the active ingredient of an extensively employed quack medicine, namely *Morison's*, which, in large doses, has in several instances proved fatal.

[4] It passes through the kidneys unchanged.

[5] Beckmann is of opinion that the *stannum* of the ancients was neither our tin nor a peculiar metal, but the regulus of lead, or *werk* of the Germans, as procured by the first smelting of the ore, which always contains silver. — *Hist. of Inventions*, vol. iv. p. 7.

(*Pol.*), Stagno (*I.*), Estanu (*S.*), Estanho (*Portug.*), Olowo (*Russ.*), Galai (*Turk.*), Resass (*Arab.*), Rangha (*H.*), Tágárum (*Tam.*), Urzeez (*Pers.*), Tima (*Malay*), Trupso (*Sans.*), Yang-seih (*Chinese*).

This metal is not very diffusely spread over the surface of the globe, but is very abundant in the places where it occurs. It is plentifully procured in Cornwall[1]; and mines of it are also wrought in the Erzgebirje, on the borders of Bohemia; in the Province of Gallicia, in Spain; and in the Peninsula of Malacca, in Asia. It is said also to have been found in Chili.

It occurs

A. In its metallic state;

i. United with sulphur and copper. Sp. 1. *Tin Pyrites.*

B. Oxidized:

ii. Combined with oxide of iron and silex. 1. *Tin stone.* 2. *Wood tin.*

The purest and best tin of Cornwall is procured from the tin-stone, or *stream-tin,* which is found beneath the beds of streams, particularly at Carn, near Perran. The ore is found under a stratum of clay about fifty feet thick, and a layer of roundish stone; occurring loose in lumps and grains of various sizes. It is first washed, then bruised, and passed through wire sieves containing sixteen meshes in the square inch; and next smelted with charcoal in a common blast furnace, through a hole in the bottom of which the reduced metallic tin flows into a pit below. To purify it, the tin in the fused state is ladled from the pit into an iron boiler, placed over a fire; and pieces of charcoal plunged, by means of an iron instrument, to its bottom, which occasions an ebullition, and causes any slag it contains to rise to the surface, whence it is skimmed off. The tin is lastly cast into bars or pigs, weighing from two to three cwt. each.[2]

Qualities. — Tin has a very slight, somewhat disagreeable taste, and emits a peculiar odour when rubbed. It has a bluish-white colour and the brilliancy of silver, but it soon tarnishes on exposure to the air. It is very malleable, but has little ductility and tenacity; is easily cut with a knife; and is flexible, producing a peculiar crackling noise when bent backwards and forwards. Its specific gravity, after fusion, is 7·291; and after being hammered, 7·299.[3] It melts at 442° Fahr., and is quickly oxidized, assuming

[1] It is uncertain when the Cornwall mines were first wrought. The Phœnicians came to Britain for tin; and there is a tradition in Cornwall, that the very old forsaken works were those of the Jews, and are therefore called *Attal sarazim,* the Jew's cast-off works. — *Norden's Description of Cornwall,* 4to. 1728. p. 41.

[2] *Aikin's Dictionary of Chymistry.*

[3] Brisson.

a grey colour; but is not volatilized, and on cooling crystallizes in rhombs. Although tin exposed to the air soon loses its lustre, yet it is not oxidized even when moisture is present. The grey oxide formed on its surface, when it is melted, becomes yellow if the heat be continued; and if raised to a full red heat it takes fire, acquires a pure white colour, and is converted into the peroxide. It is also oxidized by many acids; and combines readily with sulphur. The equivalent of tin is 58·82.

Tin, melted and agitated briskly in a heated mortar with a warm pestle till it cools, or shaken in a wooden box, is reduced to a kind of powder, consisting of small rounded particles, with very little lustre; but it is still in the metallic state. This is the powder of the Pharmacopœias. It is often adulterated with lead; but this is readily detected by dissolving it in nitric acid, the lead is completely dissolved, and the tin forms a white powder. If lead be present, a yellow iodide is formed by adding a solution of iodide of potassium to the diluted nitrate.

Medical properties and uses.—Tin is anthelmintic. It was formerly used in hysteria and hypochondriasis; but its efficacy in these complaints cannot extend beyond its power of dislodging worms. It is generally supposed to operate mechanically only; but it has been suggested, that "it is not improbable, it may act by generating hydrogen gas in the intestinal canal, which proves noxious to the animal; and its efficacy has been said to be increased by combination with sulphur, by which sulphuretted hydrogen gas will be evolved."[1] For the mode of exhibiting it, see *Pulvis Stanni* among the Preparations.

Officinal preparation.—*Pulvis Stanni,* E. D.

STANNI PROTOCHLORIDUM, *Lond. Appendix.* Protochloride of Tin. See *Pharmacopœia Appendix.*

STAPHISAGRIA. Vide *Delphinium.*

STRAMONIUM. See *Datura.*

STRYCHNIA, *Lond.* See Part III.

STRYCHNOS. *Spec. Plant. Willd.* iii. 1052.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Loganiaceæ.
G. 385. *Corolla* five-cleft. *Berry* one-celled, with a ligneous bark. *Roxburgh's Coromandel,* i. p. 8. pl. 4.
Officinal. NUX VOMICA, *Lond. Edin. Dub.* Nux Vomica. The seeds of Strychnos, Nux Vomica.

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[1] Murray, *System of Materia Medica,* i. 490.

Syn. Noix Vomique (*F.*), Yettie cottay (*Tam.*), Culaka (*San.*), Kaachla (*Hind.*), Khanèkulkelb (*Arab.*), Ma-tseen (*Chinese*), Cay-en-chi (*Cochin-Chinese*).

This species of Strychnos is found in the Indian Archipelago, in Ceylon, Malabar, on the coast of Coromandel, and in Cochin-China. It is a tree of a moderate height, and much branched. The leaves are opposite, ovate, smooth, acuminate, three to five-nerved, with two costæ running on each side of the midrib, from the base to the apex of the leaf, which is pointed. The flowers are few, corymbose, small, spreading, greenish-white, and exhale a disagreeable odour. The calyx is five-cleft, deciduous; the corolla is also five-cleft. The fruit is about the size of a small orange, covered with a smooth, crustaceous, orange-yellow bark, and filled with a fleshy pulp, in which are imbedded several orbicular, flattened seeds, a little convex on one side and concave on the other, where their point of attachment is: they are generally about $\frac{3}{4}$ of an inch in diameter, $\frac{3}{8}$ of an inch in thickness, and covered with a grey, velvety pellicle. The interior of the cotelydons of the seed is horny, of a dull-white colour, and semi-transparent.[1]

Qualities.—Nux vomica is inodorous, and has a very bitter, acrid taste, which remains long on the palate. The powder, besides this taste, has also some sweetness. Its active principles are yielded to alcohol, affording a tincture, which, if evaporated in close vessels, leaves an extract, containing all the virtues of the seed. Sulphuric acid blackens, nitric acid reddens it. According to the analysis of Pelletier and Caventou, the principles of nux vomica are *strychnine* (strychnia), *igasauric acid,* with which the strychnia is combined, *igasaurate of brucia,* a *yellow colouring matter,* a *concrete oil* soluble in alcohol, *gum, starch, bassorin,* and a small quantity of *wax.* Besides which, according to Berriol, it contains ready-formed *lactate of lime;* and according to Martius, *an oil.*[2]

Strychnia, formula $C_{42}\ H_{22}\ N_2\ O_4$ (Regnault). Its properties, &c. are described in Part III. (Alkaloids).

Brucia, the second alkaloid contained in the Strychnos nux vomica; contained also in false Augustura bark, and in the beans of Strychnos St. Ignatius. It is obtained by the same processes as strychnia, from which it can be separated by its greater solubility in cold alcohol. When pure and anhydrous, it cannot be obtained in a crystalline state; but in a hydrated condition it can be made to crystallize in right prisms with a rhombic base; the crystals effloresce, and by heat lose all the water of crystallization,

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[1] It is remarkable that upwards of 30,000 pounds of nux vomica are annually imported into Great Britain.

[2] This oil was detected by Th. Martius: it exists to the extent of 0·5 per cent. in the seeds.—*Buchan's Report,* li. part iii.

and the anhydrous brucia fused into a waxy-looking substance. *Brucia* is much more soluble in water than strychnia, requiring about 500 parts of boiling water to dissolve it; it is also very soluble in alcohol, but not in ether. Its solutions are alkaline and intensely bitter. *Brucia* forms salts with acids, most of which are crystallizable.

The formula of anhydrous brucia is $C_{46}\ H_{26}\ N_2\ O_8$ (Regnault); that of the hydrate $C_{46}\ H_{26}\ N_2\ O_8 + 8\ H\ O$.

Brucia can be readily distinguished from strychnia by the following reactions. It strikes a blood-red colour with strong nitric acid, which colour is changed to violet by the addition of protochloride of tin; it does not give the lilac colour with chromic acid or peroxide of manganese and sulphuric acid as strychnia does; and, as above stated, it is much more soluble in alcohol and water. The acid with which this alkaloid is united in the nux vomica is stated to be the igasauric, or strychnic acid. It has been stated by Dr. Fuss, and Erdmann is said to have confirmed his experiments, that brucia is not a distinct alkaloid, but a combination of strychnia and resinous matter; but, apart from chemical considerations, looking at the very intense action of strychnia on the animal economy, and the very slight influence of brucia, this would hardly appear probable; at least the statement requires much further confirmation before it can be regarded as accurate.

Igasauric, or *strychnic acid*, when pure, can be crystallized. It is soluble in water and alcohol; its solutions are acid, and strike a green colour with salts of copper.

Medical properties and uses.— Nux vomica is stimulant, tonic, and narcotic. It has been long known as a virulent poison, exerting its influence chiefly on the spinal cord, and producing violent tetanic convulsions, laborious respiration, rigidity of the voluntary muscles, and spasmodic contraction of the heart, and of the whole arterial system, causing death.[1] In small doses, the tonic influence of nux vomica is made apparent by the improved appetite and digestion; and the equalization of the circulating fluid effecting a more healthy action of the cutaneous capillaries. When the dose is increased beyond a certain point, it affects the muscular system, causing a sensation of debility and weight in the limbs, tremors, and slight convulsive twitchings, with such an increase of the sensibility of the surface that the smallest touch brings on the convulsions. All the muscles of the body are more or less affected, and aphrodisiacal symptoms are awakened in both sexes. In the male, erections of the penis take place. In still larger doses it causes violent tetanic convulsions, with a feeling of alarm and rigidity of the muscles, affecting especially the diaphragm, which

[1] It is poisonous to dogs, rats, and many other quadrupeds; but hogs and goats eat it with impunity. It is also eaten by several species of Ramphates, or Toucan.

causes asphyxia and death. Post-mortem dissection displays redness of the mucous membrane, and venous congestion. Sometimes, but rarely, there is softening of the brain or the spinal cord. Nux vomica has been given with advantage in pyrosis[1]; but its chief use is in paralysis of the lower limbs, the consequence of rheumatism, or poisoning by lead. The obvious effect of the medicine is pain, with involuntary tetanic movements of the limbs; but these cease, and motion from volition is gradually acquired. It is a curious fact that the paralytic limbs are most affected. Nux vomica appears to influence the muscles of the intestinal canal; and in obstinate constipation from loss of power, and in some cases tympanites from the same cause, it has been used with advantage. It is chiefly on the motor nerves that nux vomica displays its power; hence paralysis of the sentient nerves is less under its control than that of the motor nerves. Unless the dose is sufficiently large to cause topical inflammation of the stomach, dissection affords no indication of its mode of acting; but as it causes tetanus even when the spinal cord is divided near the occiput, it may be presumed that the brain is not affected by it. It has been advantageously used in impotence. The bark of nux vomica (*false cusparia*, as it is erroneously called) operates nearly in the same manner as the seeds, on man, causing violent tetanic convulsions, when administered in large doses, augmenting sensibility, copious perspiration, erection of the penis, involuntary evacuation of the bladder, tetanus, asphyxia, and death. The post-mortem appearances are similar to those displayed in death from nux vomica or strychnia; and, in both instances, strychnia is the active agent. When nux vomica operates as a poison, the rapidity of its action is in the ratio of the facility with which it can enter the circulation. Thus, when it is injected into a vein, or applied to a serous surface, it acts more rapidly than when taken into the stomach.

The alcoholic extract is the best form of giving the medicine. The dose is from gr. ss. to gr. j. of the extract, given night and morning, at first, and afterwards three or four times a day. The dose of the crude powdered nut is from grs. v. gradually increased. The strychnia is a more certain and manageable remedy. I have found it is most readily administered in the form of acetate, which is easily made by dissolving one grain of the salt in a fluid drachm of distilled vinegar. Of this solution ten minims are a sufficient dose to commence with; but it may be augmented until the tetanic twitchings display themselves. It is thrown down by tannin; thence the salts of strychnia should not be prescribed in conjunction with astringent infusions and decoctions. The action of *brucia*

[1] Dr. Fleming informs us that the natives of Hindostan add the seeds to arrack to increase its intoxicating property.

on the economy has usually been considered to be the same in character as that of strychnia, but much less in intensity. Andral stated that it has $\frac{1}{6}$ the strength of impure strychnia, and $\frac{1}{12}$ that of the pure alkaloid. Magendie also found it to be of $\frac{1}{12}$ the strength of strychnia; however, some experiments on animals have convinced the Editor that these statements are erroneous, and that probably impure brucia was made use of by the above-mentioned physicians, for he has found that when perfectly pure brucia (free from all traces of strychnia) was employed, an animal was enabled to take of this alkaloid, without any symptom being produced, at least thirty times the amount, which, when strychnia was substituted, was sufficient to destroy it in a few minutes. It has been used in the cure of intermittents. Certainly its action merits further investigation.

Officinal preparations.—*Strychnia*, L. E. D. *Strychniæ Murias*, D. *Extractum Nucis Vomicæ*, L. E.

STYRAX. *Spec. Plant. Willd.* ii. 623.

Cl. 10. *Ord.* 1. Decandria Monogynia. *Nat. ord.* Styraceæ.
G. 874. *Calyx* inferior. *Corolla* fnnnel-shaped. *Drupe* two-seeded.
Sp. 1. S. *officinale.*[1] Officinal Storax. *Med. Bot. 3d edit.* 291. *t.* 101. *Hayne*, xi. 23.
Sp. 3. S. *Benzoin.* Benjamin-tree. *Med. Bot.* 3*d edit.* 294. 2. 102. *Phil. Trans.* lxxvii. 307. *Hayne*, ii. 24.

1. STYRAX OFFICINALE.

Officinal. STYRAX, *Lond. Edin.* Storax Balsam. Liquid Balsam of an uncertain plant, *L.* Balsamic exudation of Styrax officinale, *E.*

Syn. Storax (*F.*), Aechte Storax (*G.*, *Dan.*, *Swed.*), Stryaxboom (*Dutch*), Storace (*I.*), Esteraque (*S.*), Estoraque (*Port.*), Usteruk (*Arab.*).

The officinal storax tree is a native of the south of Europe, Syria, Arabia, and the Levant, flowering in July. It rises about fifteen feet in height, sends off many branches, and is covered with a rough grey bark. The leaves, which are about two inches long, an inch and a half broad, and of a bright green on the upper surface, and hoary on the under, are petiolate, alternate, elliptical, pointed, and entire. The flowers are in terminal clusters; the corolla is monopetalous, funnel-shaped, large, and of a white colour: the filaments are placed in a regular circle, and apparently adhere at the base, supporting erect, oblong anthers: and the germ is oval, with a slender style and simple stigma. The fruit is a juiceless drupe, of an ovate globular form, containing one or two compressed angular nuts.

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[1] Στυραξ Dioscoridis. The tree thrives in the south of England.

From this tree, Storax is obtained in Asiatic Turkey. It issues from incisions made in the bark; and, as it was formerly the custom to collect and export it in reeds, it was named Styrax calamita.[1] Many varieties are noticed by authors[2], but only two kinds of storax are usually found in the shops; namely, *liquid storax,* and *storax in the lump,* or *red* or *common storax,* which is mixed with sawdust and other impurities. Both kinds are brought from the Levant in chests and boxes.

Qualities. — *Liquid storax,* which is procured by pressing together narrow strips of the bark until a substance of the consistence of butter is procured. It is opaque, of a grey colour, near the consistence of bird-lime and the odour of storax. *Common storax* has a fragrant odour, and a pleasant, sub-acidulous, slightly pungent, and aromatic taste. It is of a reddish-brown colour, and brittle at the ordinary temperature of the air, breaking with a shining, resinous fracture; but soon softens between the fingers, and melts at a low heat, exhaling a strong odour of benzoic acid. In a higher degree of heat it burns with a white flame, and leaves behind a light spongy charcoal. It is deprived of its red colour, and the little transparency it possesses, by chewing; and becomes in a remarkable degree more brittle. To water it imparts a yellow colour, and its odour and taste; but in distillation scarcely any oil is obtained. Alcohol and ether dissolve it completely, leaving only impurities; and the tincture is decomposed by the addition of water. Its constituents are *volatile oil, resin,* a *subresin, benzoic acid, gum,* and *extractive,* a *peculiar matter* extracted by potassa, *ammonia, lignin,* and *water.*[3] A principle named *styracine* was found by Bonastre, and *cinnamic acid* has also been discovered in storax by Simon; and lastly, Toel, who has more recently investigated the subject, finds that the *styracine* of Bonastre consists of *cinnamic acid* united with a principle analogous to the glycerine of common fats, and which, when separated, he has designated *styrone;* hence *styracine* is analogous to ordinary fatty substances. The formula for styrone is $C_{42}\,H_{21}\,O_3 + 2\,HO$; for cinnamic acid $C_{18}\,H_7\,O_3$; for styrocine $C_{60}\,H_{28}\,O_6$. In entering into the composition of styracine, styrone loses two equivalents of water.[4]

Medical properties and uses. — Storax is stimulant, and in some degree expectorant. It was formerly much prescribed in asthma, catarrh, phthisis, and menstrual obstructions; but it is now scarcely ever employed, except as an adjunct on account of its fra-

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[1] No storax of this description is now to be met with in the shops. It is said, also, to flow after the punctures of insects.

[2] Dr. Pereira mentions nine.

[3] *Reinsch, Pharm. Cent. Blatt. fur.* 1838, § 537. and § 10.

[4] *Chemical Gazette,* July 2d, 1849.

grance; and, certainly, it cannot be recommended in the above complaints. The dose is from grs. x. to ʒ ss.

Officinal preparations.—*Styrax præparata*, L. *Extractum Styracis*, E. *Pilula Styracis composita*, L. *Pilulæ Styracis*, E.

2. STYRAX BENZOIN.[1]

Officinal. BENZOINUM, *Lond. Edin. Dub.* The balsam from incisions in the bark, hardened in the air, *L.* Concrete exudation, *E. D.* Benzoin, or Gum Benjamin.

Syn. Benzoin (*F.*), Benzoé harz (*G.*), Benzoin (*Dutch, Swed.*), Benzoe (*Dan.*), Belzuino (*I.*), Benjui (*S.*), Beijoim (*Portug.*), Lubán (*H.*), Liban (*Arab.*), Malacca Sambranie (*Tam.*), Menian (*Jav.*), Caminyan (*Malay*).

The benzoin or benjamin tree is a native of Java, Sumatra, Borneo, and Siam. It is a tree of moderate size, never used as timber, sending off many round branches, which are covered with a whitish downy bark. The leaves are alternate, on round, striated, tomentose petioles, oval-oblong, quite entire, pointed, veined, smooth above and tomentose beneath; crisp, inclined to curl at the apex, and yielding a strong odour of turpentine. The flowers are in compound, axillary clusters, nearly as long as the leaves; with the common peduncle tomentose; the partial alternate, spreading, and tomentose; the pedicels short; and the flowers all hanging on the same side; the calyx is bell-shaped, short, and downy; the corolla consists of five linear, obtuse petals, four times longer than the calyx, connected together at the base, and externally cineritious; the filaments are ten, a little shorter than the petals, connected at the base, and supporting linear, erect anthers: the ovary is superior, ovate, and downy, with a slender style and simple stigma; the seeds are of a brown colour.

The Styrax benzoin is of very quick growth. The seeds are sown in the paddy or rice grounds, and require no care after they germinate, except to clear away the under shrubs from the young trees. Benzoin is obtained from this tree when it is six years old, by wounding the bark of the trunk, near the origin of the lower branches. The tree is never wounded under six years of age; and cannot sustain these annual incisions above twelve years. A tree yields about three pounds of balsam annually. It is brought to this country in large masses packed in chests and casks. There are two kinds of benzoin known in the market, namely, *Siam* and *Calcutta benzoin.* The best is of a yellowish-brown colour, containing many white amygdaloid masses or tears; the greater the

[1] Benzoin was long supposed to be the produce of a species of laurus, a native of Virginia, which on this account was named L. *benzoin:* this error was detected by Linnæus; but the real genus of the plant which yields it was first assigned by Mr. Dryander.— *Phil. Trans.* lxxvii. 307.

number of these tears, the better is the benzoin accounted. *Calcutta* benzoin is imported in large masses, bearing the impression of cloth on its surface. It contains very fine tears: the worst is blackish and full of impurities.

Qualities.—Benzoin has a very agreeable[1], fragrant odour; but scarcely any taste. Its specific gravity is 1·092. The mass is somewhat translucent, brittle, and breaks with a resinous fracture. When heated it exhales white fumes of a very fragrant, pungent odour, which are volatilized benzoic acid combined with volatile oil. Boiling it in water, lime and water, or solutions of the fixed alkalies, extracts the benzoic acid it contains, which can be afterwards separated from the salts thus formed, by the addition of an acid. Sulphuric acid dissolves benzoin, and benzoic acid sublimes. Nitric acid, assisted by heat, dissolves it with violence, and the solution, on cooling, becomes turbid, and crystals of benzoic acid separate. In both these processes artificial tannin also is formed. Alcohol and ether readily dissolve benzoin, which is again precipitated from the tincture, in the form of a white powder, by the addition of water. According to Mr. Brande's analysis, 100 parts of benzoin, distilled alone, yield, of *benzoic acid,* 9·0; *acidulous water* 5·5; *butyraceous empyreumatic oil* 60·0; *charcoal* 22·0; *carburetted hydrogen* and *carbonic acid* 3·5 parts.[2] Stolze analysed the tears of white masses, and the brown connecting medium separately, and procured the following results:—From 1000 grains of each he procured, of *yellow resin,* soluble in ether, T. 798·25, M. 88·00 + *brown resin,* insoluble in ether, T. 2·50, M. 697·25 + *benzoic acid,* T. 198·00, M. 197·00 + *extractive,* T. 0, M. 1·50 + *impurities and loss,* T. 1·25, M. 16·25. For an account of the properties of Benzoic acid, see Part III.

Medical properties and uses.—Benzoin is regarded as expectorant, and was formerly employed in asthmas and other pulmonary affections; and is still used for that purpose by the Tamool physicians: but it is scarcely ever ordered in modern European practice; and is principally employed for preparing the acid.[3] It has no influence in lessening the disposition to form uric acid, as has been supposed.

Officinal preparation.—*Tinctura Benzoini composita,* L. E. It is used in the preparation of *Acidum Benzoicum,* E. D.

SUCCINUM.[4] SUCCINI OLEUM, *Dub.* Amber. The oil obtained by its destructive distillation.

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[1] It is employed by the Malays to perfume their temples.

[2] *Nicholson's Journ.* x. 86. *Thomson's Chymistry,* 4th ed. v. 129.

[3] Dr. Paris (*Pharmacologia*) gives the following formula for preparing *fumigating pastiles:* ℞ *Benzoini* ʒ j., *Cascarillæ* ʒ ss., *Myrrhæ* ℈ j., *Olei nucis moschatæ, olei Caryoph.,* āā grs. x., *Potassæ Nitratis* ʒ ss., *Carbonis ligni* ʒ vj., *Muc. G. Tragacanthæ, q. s.*

[4] Ἤλεκτρον Græcorum.

Syn. Succin (*F.*), Bernstein (*G.*), Barnsteen (*Dutch*), Bernsteen (*Dan.*), Bernsten (*Swed.*), Bursztyn (*Pol.*), Ambra gialla (*I.*), Sucino (*S.*), Alamba (*Port.*), Iantar (*Russ.*), Amber (*Tam.*), Karooba (*Pers.*), Kepoor (*H.*), Ambar (*Malay*), Kernulbehr (*Arab.*).

This substance is dug out of the earth in Ducal Prussia, near the sea-coast; it is also thrown up in considerable quantity by the sea on the shores of Polish Prussia and Pomerania, particularly after tempestuous west or north-west winds.[1] It is evidently of vegetable origin, and the lumps occasionally enclose small pieces of twigs and insects in their substance.[2] The greater part of what is brought to this country comes from the Baltic; and a small quantity from Catania, in Sicily, packed in chests. It is also found in Maryland, at Cape Sable, associated with iron pyrites and lignite.[3]

Qualities. — Amber is insipid, and also inodorous, except when heated, when it emits a fragrant odour. It is brittle, light, hard, and semi-transparent, with a considerable degree of lustre; is commonly of a golden-yellow or brown colour, but occasionally a pale-yellow, or nearly colourless, and is electric. Its fracture is vitreous; its specific gravity 1·065. It softens when heated, and in a strong heat burns with a yellow flame, leaving a light, glistening soft coal. It is nearly insoluble in water, to which, however, it gives, when it is boiled with it, a sweetish odour, a yellow colour, and a bitter taste. Alcohol takes up about one eighth part of amber, forming a tincture which is rendered milky by the addition of water, and precipitates a resin. The alcoholic solution contains a free acid. When boiled with fixed alkalies it forms a soap; and even a cold, weak solution of potassa dissolves it, requiring, however, a considerable length of time. Sulphuric acid converts amber into a black resinous mass, which contains artificial tannin. Nitric acid, assisted by heat, acts violently upon it: nitrous gas is emitted, and the amber is, ultimately, entirely dissolved. Its constituents appear to be chiefly *two resins*, a *volatile oil*, *succinic acid* ($C_4\ H_2\ O_5 + H\ O$), and a peculiar principle having some affinity to *lac.* Its ultimate constituents, according to Dr. Ure, are 70·68 of *carbon* + 11·62 *hydrogen* + 7·77 *oxygen* = 90·07. It is distinguished from resins by its higher refractive power, and the peculiar odour which it emits when rubbed or held near a hot iron. When amber is acted on by boiling alcohol, both resins are taken up; but as the solution cools one is deposited.

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[1] It is found in small quantities on the east coast of Britain; and small pieces of it are occasionally found in the gravel-pits round London. The largest mass of amber ever found was met with near the surface of the ground in Lithuania. It weighs 18 lbs., and is preserved in the royal cabinet at Berlin.

[2] Sir D. Brewster informs us that its optical properties display its vegetable nature. — *Edin. Phil. Journ.* ii.

[3] It is found native, also, in the Ural.

The oil of amber, as immediately procured by the distillation of amber, is of a pale straw-colour, which deepens to a dark colour; it has a thick consistence and a very fœtid odour; but by successive distillations it is rendered thinner, of a lighter colour, and at length is obtained nearly limpid, and as fluid as alcohol. It does not pre-exist in the amber, but is the result of the process. Its specific gravity, at 75°, is ·758.

Qualities.—Rectified oil of amber has a strong, ungrateful odour, and a hot, acrid taste. It is light, volatile, and inflammable. It is slowly acted on by heat and air, becoming black and hard. It boils at 186°: imparts its taste and smell to water; but nothing more: is soluble in strong alcohol, and combines with oils.

Medical properties and uses.—Amber, although it was in high estimation among the ancients as a medicine, is now only used in pharmacy for the purpose of obtaining the oil and acid which it yields by distillation. Oil of amber is stimulant, antispasmodic, and rubefacient. It has been found serviceable in deficient menstruation, and in hysteria, epilepsy, and some other convulsive affections; but it is now scarcely ever administered as an internal remedy. The dose may be from ♏ v. to ♏ xij., combined with any distilled water by means of mucilage. It is more generally employed as a rubefacient in rheumatism and paralysis; and a mixture of f ℥j. of this oil with f ℥ss. of tincture of opium has been found beneficial as a friction in tic doloureux; and in hooping-cough, rubbed on the chest twice or three times a day.[1]

SULPHUR, *Lond. Edin.* SULPHUR SUBLIMATUM, *Dub.* SULPHUR PRÆCIPITATUM, *Lond.* Sulphur. Sublimed Sulphur. Precipitated Sulphur.

Syn. Soufre (*F.*), Schwefel (*G.*), Zwavel (*Dutch*), Zolfo, Solfo (*I.*), Azufre (*S.*), Euxofre (*Port.*), Svovel (*Dan.*), Svavel (*Dutch, Swed.*), Siarka (*Pol.*), Seva (*Russ.*), Kabril, Kibreet (*Arab.*), Ghéndagum (*Tam.*), Gandhaca (*San.*), Gowgird (*Pers.*), Blerong (*Malay*), Gundaka (*Cing.*).

Sulphur is found native in the neighbourhood of volcanoes; and sometimes, although rarely, in veins traversing primitive rocks.[2] At the Solfatara, near Naples, it is dug up in a state of comparative purity, being mixed with a white earth only, from which it is separated by sublimation, and the sulphur thus freed is melted and

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[1] The empirical nostrum, known by the name of *Roche's Embrocation*, for hooping-cough, consists of two parts of olive oil, one part of oil of amber, and one part of oil of cloves.

[2] As for example, in the sulphur mountain of Ticsan, in South America, where the sulphur is disseminated in small masses, having no contiguity with one another, in the quartz which traverses the mica slate, parallel to its strata. The sulphur is dull, friable, and breaks with the slightest blow.—*Ann. de Chim.* xxvii.

cast into moulds, forming the roll sulphur of commerce. It is imported into Britain chiefly from Sicily[1], where it exists in beds in a blue clay formation, and from Naples; but a proportion of what is used in this country is obtained from the roasting of pyrites. At the Parys mines in Anglesea were works for this purpose on a large scale; where, in working the copper pyrites, the sulphur volatilized in the roasting was collected in chambers, which were connected with the domes of the furnaces by means of horizontal flues. Each chamber had a door, by means of which it was cleared of the sulphur once in six weeks. This is the general mode of obtaining sulphur from pyrites; and thus procured, it is in rough, pulverulent, spongy crusts, of a dirty greyish-yellow colour. In order to purify it, the crusts are broken and thrown into a boiler, in which it melts: and after the impurities are separated by skimming and subsidence, it is cast into cylindrical moulds, forming roll sulphur; or into cones about two feet high, which form the loaf sulphur of commerce.[2]

The common English roll sulphur is said often to contain a full fifteenth part of orpiment, while the Sicilian sulphur contains seldom more than three per cent. of a simple earth; and therefore is justly preferred. Both of them are purified in the large way by conducting the vapour of melted sulphur into close chambers, where it concretes in the form of a fine powder: but, for medicinal use, that which is sublimed by heating on a sand-bath, an earthen cucurbit, charged with roll sulphur, and conveying the vapours to be condensed into a set of pots or alludels placed round the cucurbit, is to be preferred. Prepared in either mode, it is the *Sulphur sublimatum*[3] of the Pharmacopœias. Sulphur, especially in the roll, contains many impurities, the amount of which may be detected by boiling 100 grains in four ounces of oil of turpentine, pouring off the solution while hot, and repeating the boilings, until no more is dissolved. The residue indicates the amount of the impurities.[4]

Sulphur occurs also in many animal and vegetable substances, as in the albuminous tissues; in certain oils, as of mustard, assafœtida, garlick, in cystine and taurine, substances occurring in urine and bile.

Qualities. — *Roll sulphur* is a crystallized, brittle, solid body, of a greenish-yellow colour, has a peculiar well-known odour when rubbed or heated, and is insipid. It breaks from the heat of the

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[1] In Sicily it is procured from *Samattino*, *Gallati*, *Trabria*, *Pentellaria*, *Licati*, *Salato*, *Palmo*, *Tavara*, *Girgenti*, and *Falconara*. The Harz yields 954 cwt. of sulphur annually.

[2] The *sulphur vivum* of the shops is the impure dregs of this process.

[3] Θειον πεπυρουμενον Dioscoridis.

[4] *Brande's Manual*, p. 178.

hand, when held in it for a short time. It is a non-conductor of electricity, and becomes negatively electrical when rubbed. Its specific gravity is 1·99. *Sublimed sulphur* is in the form of a very bright-yellow powder, and contains a minute portion of sulphurous acid, from which it can be separated by washing with water. Sulphur melts and volatilizes under 220° Fahr.; and what is singular, by increasing the heat to 320°, it becomes thick and viscid, and if then poured into water, it assumes a red colour and ductility like wax [1], while its specific gravity is increased to 2·325; at about 600° Fahr. it again becomes fluid. Sulphur assumes two distinct crystalline forms; an octohedron with a rhombic base (native sulphur, and also that which crystallizes from solution at ordinary temperature), and a lengthened prism, which occurs when it crystallizes at a high temperature from melted sulphur. When heated in the air it inflames at 300°, and burns with a pale blue flame, emits pungent suffocating vapours, and becomes acidified; the acid is the sulphurous. It is insoluble in water, but soluble in a small degree in alcohol, ether, oils, and bisulphuret of carbon; and combines with the alkalies, and many of the earths and metallic substances. The equivalent of sulphur is 16. Sulphur procured from pyrites is almost always contaminated with arsenic.

SULPHUR PRÆCIPITATUM of the London College is stated to be that which is precipitated from the sulphuret of calcium by means of hydrochloric acid, and its characters are as follows:— It has a pale-yellow colour; water in which it has been boiled does not turn litmus red; and in other respects it agrees with the ordinary sulphur. It used to be called Milk of Sulphur, or Lac Sulphuris. It consists of a very fine powder, which generally coheres together in lumps; has some sulphurous odour, but little taste. When exposed to air, it is apt to become acid from oxidation. It is very often adulterated, generally with sulphate of lime, and some specimens have been known to consist chiefly of this salt. It contains also a little water, but does not appear to be a real hydrate, as has been sometimes supposed. By Rose it has been said to contain bisulphuret of hydrogen, to which he attributes its whiteness.

Medical properties and uses.— Sulphur is laxative, and a stimulating diaphoretic. From the gentleness of its operation on the bowels, it is one of the best means of keeping them lax in hæmorrhoidal affections; and the diaphoresis which it at the same time excites has rendered it serviceable in chronic rheumatism and catarrh, and in atonic gout, rickets, asthma, and other pulmonary affections not attended with acute inflammation. It is supposed that it combines with hydrogen in the stomach. It manifestly

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[1] In this state it is kneaded under the water, and used for receiving the impressions of seals and medals.

transpires through the skin, perhaps, however, in the state of sulphuretted hydrogen, which may be the cause that silver is blackened when kept in the pockets of those who take sulphur. It is specific in scabies and some other cutaneous affections, in which it is applied externally, and taken internally at the same time.

The dose may be from ℈ j. to ʒ ij., mixed into an electuary with syrup or treacle, or it may be given in milk. To promote its purgative power it may be combined with bitartrate of potassa; and in hæmorrhoidal cases its best adjunct is magnesia.

The action of Sulphur Præcipitatum seems to be the same as that of the ordinary sulphur, although some have supposed that the trace of sulphuretted hydrogen contained in it might modify its therapeutic properties.

Officinal preparations.—*Sulphur sublimatum*, E. *Unguentum Sulphuris*, L. E. D. *Unguentum Sulphuris compositum*, L.

SUMBUL, or MUSK ROOT, called also JATAMANSI.

Under this name, a root appears to have been employed for a long period in India, Persia, and the Eastern countries, as a perfume, an incense at religious ceremonies, and also as a medicine. Within the last few years it has been introduced into this country for the latter purpose, chiefly through the recommendation of Dr. Granville [1], who, in 1850, published a pamphlet containing an account of the history of the drug, its physical and chemical characters, and also the diseases for which it has been employed, both abroad and in this country.

It appears that this plant inhabits the northern and eastern parts of India, as Nepaul, Bootan; but not British India. Most of it is sent to Russia, from whence it is exported to other parts of Europe; within the last month, some has reached this country through Bombay.[2] The drug, as imported into this country, is in circular pieces, varying from one to three or four inches in diameter, and from one to three inches in length, which appear to be transverse sections of the root of the plant: the epidermis is of a light-brown colour, wrinkled; the inner substance consists of coarse, irregular fibres, which are easily separated from each other. When the transverse section is examined, it appears porous and composed, through the greater part of its diameter, of bundles of coarse fibres, loosely aggregated together. The odour of the root is strong and musk-like, hence the name of musk-root, which has been applied to it; its taste is sweetish and balsamic, and the odour is powerfully evolved during mastication.

Qualities. — Chemical analysis has not thrown much light upon

[1] The *Sumbul*, a New Asiatic remedy. By A. B. Granville, M.D., F.R.S.

[2] *Pharmaceutical Journal*, Feb. 1852.

the composition of sumbul. The examinations made by Reinsch and others, have shown its constituents to be, *volatile oil;* 2 *resins*, one soluble in ether, the other in alcohol; *wax, gum, starch*, a *little matter*, soluble both in water and alcohol; *salts:* and lastly, an acid, capable of crystallization, which has been named *sumbulic acid.*

Medical properties and uses. — Sumbul appears to act as a powerful stimulant, especially on the nervous system. In Russia it has been used in cholera (it is said with success); also in various fevers and febrile diseases of an adynamic type. It has been much lauded by some as a remedy in nervous affections, as in hysteria, chorea, epilepsy, paralysis, and spasms of different organs, as of the stomach, &c. It appears to have much resemblance in its action on the system to valerian and allied remedies.

Sumbul may be given either in substance (masticated) or in powder, or pills, likewise as an infusion, and tincture, alcoholic or ethereal. Dose, in substance, from a scruple to a drachm, or more.

SUS. *Syst. Nat. Gmelin*, i. 217.

D. 1. Vertebrata. *Cl.* 1. Mammalia. *Ord.* 6. Pachydermata. *Cuvier.*
G. 35. *Fore-teeth* four in the upper jaw converging, and six prominent in the lower jaw. *Tusks* two shorter in the upper jaw; and two in the under jaw displayed. *Snout* truncated, prominent, movable. *Feet* cloven.[1]
Species 1. Sus *Scrofa*.[2] The Hog. *Jonst. quadr.* 99. *t.* 47.
Officinal. ADEPS, *Lond.* AXUNGIA, *Edin.* ADEPS SUILLUS, *Dub.* Hog's lard. Prepared lard, *L.*

Syn. Sain doux (*F.*), Schweineschmalz (*G.*), Swinister (*Swed.*) Swinfidt (*Dan.*), Spek (*Dut.*), Szmalee (*Pol.*), Lardo, Sugna (*I.*), Pingue, Manteca de Puerco (*S.*), Púnnie Colupoo (*Tam.*), Booboo (*Begharmi*).

The hog is too well known to require a particular description. It is an inhabitant of the greater part of the temperate regions of the globe, the wild and the domestic being varieties of the same species; and of both there are several sub-varieties. The period of gestation of the sow is four months, and the offspring is numerous, occasionally exceeding twenty at a litter, which the boar sometimes devours. The hog does not shed its teeth, and seldom lives beyond twenty-five or thirty years. It is much infested with vermin; and is subject to several diseases, particularly hydatid dropsy, scrofula, and scabies. Its food is of a vegetable nature; but it is asserted that pepper kills it. As an article of diet, the flesh of the hog, when the animal has been castrated and properly fed[3], is very palatable, and not unwholesome; and when salted it

[1] Although the term cloven is here used, yet the hog truly has four toes. It walks, however, only on two.
[2] Ὗς Aristotle.
[3] The qualities of the flesh depend much on the diet of the animal. Pork fed at a

keeps better than most other meats. But the frequent use of pork is said to favour obesity, and occasion disorders of the skin, particularly in the sedentary. The lard, which is the officinal part of the hog, is obtained chiefly from the flank of the animal. It is deposited between the skin and the muscles. To free it from the membranes and vessels, it is cut in small pieces, then very well washed in water until the water comes off colourless, and afterwards melted with a very gentle heat in a shallow vessel, and continued on the fire till the whole of the water is evaporated. While in the melted state, it is run into bladders, in which it concretes; and it is thus brought to market.

Qualities. — Lard is inodorous, tasteless, and white; soft, and nearly semi-fluid. Exposed to a heat of 97° it melts, and concretes again when cooled. It is insoluble in water, alcohol, and ether; it combines with the alkalies and forms soap. It is oxidized, if, when melted, a little nitric acid be stirred into it; and it then assumes a greater degree of firmness, with a yellow colour. By destructive distillation it affords results very similar to those obtained from the analysis of fixed oils. It consists of three fats, *stearine* and *margarine*, solid at the ordinary temperatures, and the third *oleine*, which is fluid. The proportion in 100 parts of lard is of *stearine* and *margarine* 38, *oleine* 62 parts.[1] When lard is long exposed to a warm air, it becomes yellow, emits a fœtid odour; and, owing to oxygen being attracted from the atmosphere, the sebacic acid is formed. This state of rancidity may, in some degree, be removed by washing it with very pure, soft water; which during the operation becomes acid, and reddens litmus paper.

Medical properties and uses. — Lard is emollient; and owing to its softness and unctuosity is preferable to fat as a friction, but it is seldom used for this purpose; and is chiefly employed in the formation of ointments.

Officinal preparation.—*Adeps Suillus preparatus*, D.

TABACUM. See *Nicotiana.*

TAMARINDUS. *Spec. Plant. Willd.* iii. 577.

Cl. 16. *Ord.* 1. Monadelphia Triandria. *Nat. ord.* Leguminosæ.
G. 1250. *Calyx* four-parted. *Petals* three. *Nectary* of two short bristles under the filaments. *Legume* pulpy.
Sp. 1. T. *Indica.*[2] The Tamarind-tree. *Med. Bot. 3d edit.* 448. *t.* 161. (Balam-pulli) *Rheede, Hort. Malab.* i. 39. *t.* 23. *Hayne*, x. 41.

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flour-mill is always good; and Russell says, that which is fed near Aleppo on liquorice-root, which grows in great abundance in the desert, is fat, delicious, and remarkably digestible.

[1] *Annales de Chimie*, t. xciv. p. 129.

[2] *'Οξυ Φοινικα* Nicolai Myrepsici, the last of the Greek physicians.

Officinal. TAMARINDUS, *Lond. Edin. Dub.* The pulp, or preserved fruit of the Tamarind Pod.

Syn. Tamarin (*F.*), Tamarinde (*G.*, *Dutch*), Tamarind (*Swed.*), Polpa di Tamarindo (*I.*), Tamarindo (*S.*), Tamarinho (*Port.*), Poollie (*Tam.*), Ambala (*Cing.*), Timir hindee (*Pers.*), Assam Jaba (*Malay*), Umblie (*H.*, *Arab.*), Amlica (*San.*), Kam Assam (*Jav.*).

This tree is a native of the East and West Indies, of Arabia, and Egypt.[1] It is a large, beautiful, spreading tree.[2] The leaves are abruptly pinnate, composed of sixteen or eighteen pairs of sessile leaflets, half an inch only in length, and one sixth of an inch broad, of a bright-green colour, downy, oblong, entire, and obtuse. The flowers are in loose bunches of five or six, which come out from the sides of the branches; the calyx is of a straw-yellow colour, and deciduous: the petals are also yellowish, and beautifully variegated with red veins; ovate, concave, acute, indented, and plaited at the edge; and the filaments purplish, bearing incumbent, brownish anthers: the pods are thick, compressed, and of a dull-brown colour when ripe: those from the West Indies are from two to five inches long, with two, three, or four seeds; those from the East Indies are twice as long, and contain five, six, or seven seeds: the seeds in both are flat, angular, shining, and lodged in a dark, pulpy matter.

In the West Indies, the pods are gathered in June, July, and August, when fully ripe; and the fruit, being freed from the shelly fragments, is placed in layers in a cask, and boiling syrup poured over it till the cask is filled; the syrup pervades every part quite down to the bottom, and when cool the cask is headed for sale.[3] Sometimes alternate layers of tamarinds and powdered sugar are put into a jar. The East India tamarinds are darker coloured and drier, and are said to be preserved without sugar. When tamarinds are good, they are free from any degree of mustiness: the seeds are hard, flat, and clean; the strings tough and entire; and a clean knife thrust into them does not receive any coating of copper. They should be preserved in closely covered jars.

Qualities.— Tamarinds are inodorous, and have an agreeable, acid, sweetish taste. According to the analysis of Vauquelin, the pulp contains, independent of the sugar with which it is mixed, *bitartrate of potassa, gum, jelly, citric acid, tartaric acid, malic acid,* and a *feculent matter.*[4] The acid taste chiefly depends on the citric acid, the quantity being greater than that of the other acids; ℥xvj. of the prepared pulp, contain ℥jss. of citric acid, but only ʒ xij.

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[1] *Prosper Alpinus, de Plantis Ægypti,* tab. p. 35.

[2] The natives of India think that it is dangerous to sleep under a tamarind tree during the night.

[3] *Long's Jamaica,* iii. 729.

[4] *Ann. de Chim.* v. 92.

of tartaric acid, ℥ ss. of bitartrate of potassa, and ʒ ss. of malic acid.

Medical properties and uses. — Tamarind pulp is refrigerant, and gently laxative. The simple infusion of the pulp in warm water, or a whey made by boiling ℥ ij. of it in two pints of milk, and straining, form very grateful, refrigerant beverages, which are advantageously used in febrile diseases. The dose of the simple fruit required to act upon the bowels is so large, that it is seldom given alone as a purgative, but is generally combined with cassia or manna, the action of which it augments; or with such of the neutral purgative salts as are not decomposed by it; which is the case with those that have potassa for their base, and are therefore incompatible in mixtures with this fruit. It forms an agreeable addition to infusion of senna; but the purgative power is weakened by it.

Officinal preparation. — *Tamarindus preparatus,* L.

TAPIOCA.—JATROPHA. *Spec. Plant. Willd.* iv. 562.

Cl. 21. *Ord.* 8. Monœcia Monadelphia. *Nat. ord.* Euphorbiaceæ.
G. 1719. *Male.* *Calyx* none, or triphyllous. *Corolla* one-petalled, infundibuliform. *Stamens* ten, the alternate ones shorter.
——— *Female.* *Calyx* none. *Corolla* five petals, spreading. *Styles* three, bifid. *Capsules* trilocular. *Seed* one.
Species 13. Jatropha *Manihot, Sloane Jam.* 41. Hist. i. p. 130. *t.* 85. *Brown Jam.* 349. Janipha *Manihot, Bot. Mag.* 3071.
Officinal. TAPIOCA, *Edin. Dub.* Tapioca. Fecula of root of Janipha Manihot.

This plant is a native of Brazil, but is extensively cultivated in the West Indies. It is a shrub of about six feet in height. The root is large, thick, tuberous, fleshy, white; and containing an acrid, milky-looking, highly poisonous juice. The leaves are palmate, 5—7 parted, smooth and glauceous beneath; the *flowers* are racemose, the corolla naked, and inclosing ten stamens. The tuberous part of the root is employed to yield the tapioca. It is rasped and then pressed; and the juice, being left at rest, deposits a fecula, which is well washed in funnel-shaped mat filters, and dried on hot plates, during which it assumes a granular form.[1]

When it is dried in chimneys, exposed to the smoke, and then powdered, it constitutes *Cassava,* which is made in cakes, that are sometimes imported under the name Cassada cakes. Tapioca is imported into this country from Bahia and Rio Janeiro. It resembles a seed, or warty-looking granules.

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[1] When it is dried in the air without heat it does not granulate, but resembles arrow-root, for which it has been imported into France from Martinique. It is called *Cipipa* by the Spaniards.

Qualities. — Tapioca is insipid and inodorous. It is partly soluble in cold water; boiling water dissolves it entirely, and forms with it a translucent jelly. When tapioca is merely mixed with cold water, and examined under the microscope, it is seen to consist of mullar-shaped granules, about the 2000th part of an inch in diameter, and having marked hilums.[1] The cold mucilage, tested with iodine, display the beautiful indigo-blue of iodide of amidine.[2]

Medical properties and uses. — Tapioca is one of those light starches, which are useful in the diet of the sick. In combination with milk it is a good article of food for children just weaned from the breast. With eggs, sugar, and a moderate quantity of spice, it makes an excellent pudding for the convalescent, being devoid of all irritant properties.

TARAXACUM. See *Leontodon.*

TARTARI CRYSTALLI. See *Potassæ Bitartras.*

TEREBINTHINA CHIA. See *Pinus.*

TEREBINTHINÆ OLEUM. See *Pinus.*

TEREBINTHINA VENETA. See *Pinus.*

THERIACA. See *Saccharum.*

THUS. See *Pinus.*

TIGLII OLEUM. See *Croton.*

TOLUIFERA BALSAMUM. See *Myroxylon.*

TORMENTILLA. See *Potentilla.*

TOXICODENDRON. See *Rhus.*

TRAGACANTHA. See *Astragalus.*

TRITICUM. *Spec. Plant. Willd.* i. 476.

Cl. 3. *Ord.* 2. Triandria Monogynia. *Nat. ord.* Graminaceæ.
G. 152. *Calyx* two-valved, solitary, subtriflorus. *Flower* somewhat obtuse.
* *Annual.*
Triticum *vulgare.* Common wheat.

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[1] Pereira.

[2] The poisonous juice, according to M. Henry, contains hydrocyanic acid, which being dissipated by heat, the juice, when boiled, is rendered inert.

Varieties. Triticum æstivum and Triticum hybernum. Or,
Species 1. Triticum *æstivum,* Summer Wheat. *Bauh. Pin.* 21. *Hort. Cliff.* 24.
Species 2. Triticum *hybernum*[1], Winter Wheat. *Gærtner de Fructibus, Hort. Cliff.* 24. *Bauh. Pin.* 20.
Officinal. FARINA. AMYLUM, *Lond. Edin. Dub.* PANIS, *Lond.* Flour. The flour of the seeds of Triticum vulgare, *L. E.* Of Triticum æstivum, *D.* Starch. The fecula of the seeds of Triticum vulgare, *L. E.* Of Triticum æstivum, *D.* Bread. Wheaten bread, *L.*

Syn. Farine du Froment, Amidon (*F.*), Weitzenmehl, Kraftmehl, Staerhe (*G.*), Farina di Frumento l' Amido (*I.*), Acemite, Almidon (*S.*), Fler de Farinha (*Port.*), Abgoon (*Arab.*), Neshasté (*Pers.*), Geeboonkaheer (*H.*), Godumbay mao (*Tam.*), Imno (*Beyharmi*).

The country whence this valuable grain originally came is unknown; nor is it certain that Sicily was the part of Europe where it was first cultivated.[2] It is supposed, however, to grow naturally in the country of the Buschkins. It will not vegetate beyond the 62° of northern latitude, nor within the tropics, except on land high above the level of the sea. It has two sets of roots; one set proceeding directly from the seed, and the other from what is denominated the *corona* of the plant, about two inches above the first: the *coronal* roots do not shoot till spring-time, and collect more nutriment than the *seminal* roots[3]; the ears or spikes are long, with the grain lodged in four rows, and imbricate; the Triticum *hybernum* has the chaff smooth, bellied, and terminated by very short awns; Triticum *æstivum* has awns three inches long. Many varieties of wheat are cultivated in this country, of which the *white Dantzic* is considered the best. The grain is small and translucent, and yields flour which makes more bread in proportion to the quantity of flour than that of any other variety of wheat.

After the operation of grinding, the farinaceous part of the seed is separated, by means of cloth sieves, into several distinct portions, of various degrees of fineness: but the whole may be resolved into two: 1. *flour,* which constitutes more than two thirds of the whole; and, 2. *bran,* which consists chiefly of the husks of the seed. The former consists of *starch, gluten, sugar,* and *gum.*

Starch is manufactured by steeping either entire or coarsely-bruised wheat in cold water, until it swells, and yields a milky juice when squeezed. It is then subjected to pressure in coarse bags placed in vats filled with water; and when all the milky juice is obtained, the bags are removed, and the fecula deposits itself. In a short time the supernatant liquor ferments, and alcohol and acetic acid are formed in it. The whole is now put into tubs called frames, in which the impure fecula is allowed to subside: and after

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[1] Πυρος χειμοσπορουμενος Dioscoridis.
[2] We are told that Judah traded in wheat of Minnith. Ezekiel xxvii. 17.
[3] *Hunter's Geological Essays,* Essay v.

the water is poured off, the upper part of the sediment which last subsided, being dirty and discoloured, is scraped off from the starch below; this is then repeatedly well washed, pressed in cloths, and dried by a gentle heat, during which it cracks into small columnar masses, and is the finest white starch of the shops.[1] The formula of starch is $C_{12}\ H_{10}\ O_{10}$.[2]

Qualities.—*Flour* is inodorous and nearly insipid. Water with which it has been macerated acquires an opaline colour and a sweetish taste; affords precipitates with infusion of galls and the strong acids, and rapidly becomes sour. According to Vogel, the constituents of flour are, in 100 parts *fecula* 68, *gluten* 24, *saccharine gum* 5, *albumen* 1·50. The action of these principles on each other, when flour is kneaded with water, and yeast added to the mass, excites the panary fermentation, and produces bread, a little salt being added to give it sapidity. The large proportion of gluten in wheat flour renders it fitter for this purpose than any other kind of flour. During the process, a large quantity of carbonic acid gas is evolved, which swells up the mass, and gives it the sponginess and lightness that characterize well-baked bread.[3] For the purpose of baking bread a heat of 488° is required. When flour has been long kept, it becomes musty, and undergoes the putrefactive fermentation, in which state the bread made with it is very unwholesome. Flour is fit for making bread only when all its constituents are entire; and as gluten is the most susceptible of decomposition among them, the ascertaining its presence is a proof of the goodness of the flour. M. Taddei has taught us that guiaic is a test of the presence of gluten, by striking with it a beautiful blue colour: flour, therefore, which exhibits this colour when rubbed with guiaic and a few drops of vinegar, may be pronounced good.

Wheaten Starch is inodorous and insipid: in white columnar masses, which are easily reduced to powder. It is insoluble in alcohol, ether, and cold water; but in the latter it falls into powder. Boiling water dissolves it, forming an insipid, inodorous, semi-transparent, opaline, gelatinous-like paste, which becomes brittle and opaque, when spread out in a dry air: but when exposed, without being spread out, it separates into a watery

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[1] The ordinary blue starch, which is coloured with a solution of smalt and alum in water, is unfit for medicinal uses. The Chians first made starch.

[2] 100 parts of wheat, according to Davy's analysis, contain the following proportions of gluten:—

Best Sicilian wheat	- 21 of gluten +	75 starch +	5 insoluble matter.
Spring-wheat of 1804	24	70	6
Good Eng. wheat, 1803	19	77	4

[3] The method of making leavened bread was probably invented by the Egyptians; for it appears that the Israelites were acquainted with it after they sojourned in Egypt, but not before. It was known to the Greeks during the Trojan war; but the use of yeast or *barm* was discovered by the ancient Gauls.

fluid, and an opaque paste; sours, and becomes mouldy. Alcohol precipitates starch white and tough from its solutions; acetate of lead and infusion of galls also throw it down; but the precipitate formed by the latter is re-dissolved by heating the liquid to 120°.

Medical propertes and uses. — The utility of *bread* as an article of diet requires no particular notice.[1] But bread alone is unsuitable as diet for man. As a medicinal agent it is used for forming poultices, cataplasms, and for giving bulk and form to very active medicines which require to be given in minute doses, in the solid state, or as pills. When toasted and infused in water, it gives a pleasant flavour to the fluid, and renders it more acceptable as a diluent in febrile diseases, and as the ordinary beverage of the dyseptic. *Starch* is less nutritive than bread, but is, perhaps, more digestible. It forms the greater part of the nutritive matter of the different farinaceous substances which are in general use as the diet of the sick, such as sago[2], salep[3], tapioca[4], arrow-root[5], and gruel, which are only different modifications of starch. The solution of starch is employed medicinally as a demulcent; but as it is very readily acted on by the stomach, it cannot be of much service in involving acrid matters in the intestines when taken by the mouth. In the form of enema, however, it is often and advan-

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[1] Wheat-flour is almost exclusively used for this purpose in England, part of Scotland, France, a part of Germany, Hungary, the Crimea and Caucasus, and some part of the middle of Asia. It is used also for the same purpose, but not so exclusively, in Spain, Portugal, Italy, Greece, Persia, Northern India, Arabia, Egypt, Nubia, Barbary, the Canary Islands, North America, the Brazils, Buenos Ayres, Chili, the Cape of Good Hope, and the temperate zone of New Holland. Rye, barley, and oats usurp its place in many parts of the North of Europe; rice in the East Indies, China and Japan, in Asia and Africa, in the torrid zone; and maize in part of America and of Africa. Besides these grains, yams, casava, batatas, the banana, doura (*singhum*), sago, the bread-fruit, some species of arum, chenopodium, quinoa, acrastichum *furtum*, and arachis *hypogæa*, are used in different parts of the globe as substitutes for bread.— *Schouw on the Geographic Distribution of the Gramineæ.*

[2] Sago is the pith of various species of palms. One of these, the sagu-tree of Asia, Metroxylon *sagu* (Roxburgh), when fifteen years old, will sometimes yield 6 cwt. of sago. It has been calculated, that one English acre of land will grow 435 sagu-trees, which would yield 120,500 lbs. avoirdupois of sago, or 8000 lbs. yearly; a produce triple that of wheat. — *Hist. of the Ind. Archip.* i. p. 357. See *Sago.*

[3] Salep is prepared from the bulbs of the Orchis *mascula.* The bulbs are first dipped in hot water and the skin rubbed off; after which they are placed on a tin plate, and put into a heated oven for ten minutes, and, lastly, dried in the sun. By this process, they acquire the appearance of horn, and, when pulverized, form the salep of the shops.

[4] Tapioca is prepared from the roots of the Jatropha *manihot,* as already described. See *Tapioca.*

[5] Arrow-root is the fecula of the rhizomes of Maranta *arundinacea.* The powder is prepared from roots of a year old, which, after being well washed, are beaten, and the fibrous part separated from the pulp. The farinaceous pulp is then thrown into a fresh quantity of water, and stirred until it becomes milky, when the fluid is passed through a sieve, and left at rest until the fecula is deposited. The supernatant fluid is now poured off, and the starch, after being well washed, is dried in the sun. In this state it is brought to Europe, and sold under the name of Indian arrow-root.

tageously used for allaying the effects of acrid bile on the coats of the rectum in bilious diarrhœa and dysentery; and for sheathing the rectum in cases of abrasion, and inflammation of the gut. It is the common vehicle for the exhibition of opium per anum.

Officinal preparations.—*Decoctum Amyli*, L. *Mucilago Amyli*, E. D.

TUSSILAGO. *Spec. Plant. Willd.* iii. 1962.

Cl. 19. *Ord.* 2. Syngenesia Superflua. *Nat. ord.* Asteraceæ.

G. 1483. *Receptacle* naked. *Pappus* simple. *Calyx* scales equal, as long as the disc, submembranaceous. *Corolla* female. *Florets* ligulate, toothless.

Species 12. T. *Farfara.*[1] Common Coltsfoot. *Med. Bot. 3d edit.* 45. *t.* 18. *Smith, Flora Brit.* 878. *Eng. Bot. t.* 429.

TUSSILAGO. Coltsfoot leaves and flowers.

Syn. Tussilage; Pas d'Ane (*F.*), Hauflattisch (*G.*), Hoefblad (*Dutch*), Hasthop (*Swed.*), Tussilaggo; Hestehof (*Dan.*), Tassilagem (*Port.*), Dwoje lisnik, Podbel (*Russ.*), Farfara (*I.*), Una de Cabello (*S.*).

Coltsfoot is an indigenous perennial plant, growing in moist, marley, and clayey soils. It flowers in March and April, and the leaves appear in May and June. The root is long and diffusely creeping, and sends up stems or scapes destitute of leaves, erect, five or six inches high, simple, unifloral, tomentose, with sparse, smooth, scale-like bracts of a brownish-pink colour, lying close to the stem. The flower droops before it blows, but afterwards becomes erect, and is of a golden-yellow colour: the calyx is composed of linear, trinerved, plane, smooth, purplish scales, the length of the disc, equal, uniform, and finely reflex; the flowrets of the ray are numerous, spreading, linear, twice the length of those of the disc, with a more slender stigma: the seeds are smooth, more frequently abortive, particularly in the disc; with the seed-down sessile, rough, white, and shining: the receptacle is pitted, flat at first, but finally convex. The leaves appear after the flower, are radical, petiolate, erect, cordate, angled, and toothed; smooth, green above, with reddish veins, but underneath white and woolly.

The leaves are more frequently employed than the flowers, and should be gathered and dried when they are fully expanded, before they have attained their greatest magnitude.

Qualities. — The dried leaves are inodorous, and have a rough mucilaginous taste. The mucus they contain is yielded to water by coction, and evolves by the boiling a peculiar odour.

Medical properties and uses. — Tussilago is demulcent, and has been regarded as expectorant from the earliest ages, having been

[1] Βηχιον Dioscoridis. The name is derived from βηξ, *tussis*, whence *tussilago*; showing the early opinion of the pectoral virtues of this plant.

smoked through a reed in the days of Dioscorides, with a view of relieving the chest from accumulated mucus in catarrh, asthma, and phthisis. It is still used as a demulcent in catarrhal and phthisical affections; but very little reliance is placed on its powers.[1] Cullen thought he perceived good effects result from the use of the expressed juice of the recent leaves in scrofula; but his observations have not been generally confirmed.[2]

The decoction of the leaves is the usual form of exhibiting tussilago. A handful of the leaves is boiled in O ij. of water to O j.; and the decoction, after being strained, is sweetened with sugar-candy or syrup. The dose is a teacupful.

VALERIANA. *Spec. Plant. Willd.* i. 175.

Cl. 3. *Ord.* 1. Triandria Monogynia. *Nat. ord.* Valerianeæ.
G. 75. *Corolla* monopetalous, gibbous on one side of the base, superior. *Seed* one.
* *Valerians, with a single downy seed.*
Species 6. *V. sylvestris* vel *officinalis.* Officinal, or great Wild Valerian. *Med. Bot. 3d edit.* 77. *t.* 32. *Smith, Flora Brit.* 38.
Officinal. VALERIANA, *Lond. Edin. Dub.* Valerian root. The root of the wild plant, *L. D.* Of Valeriana officinalis, *E.*

Syn. Valériane (*F.*), Wilde Baldrianwurzel (*G.*), Wilde Valeriaan (*Dutch*), Vändelrot (*Swed.*), Valeriana Silvestre (*I.*), Valerian officinal (*S.*), Balderan aptetchnoi (*Russ.*), Baldrian (*Dan.*), Kozlki (*Pol.*), Kettul gunnung (*Jav.*).

This species of valerian is an indigenous, perennial plant, flowering in June. There are two varieties of it; one growing in woods and marshy ground, the other on high pastures and heaths; and the sensible qualities of the second are considerably greater than those of the first. It has been often regarded as the *φου* of Dioscorides: but Sibthorp has proved that this opinion is incorrect, and has described the real valerian of the ancients as a distinct species, under the name of Valeriana *Dioscoridis.*[3] The roots of valerian are long and slender fibres issuing from tuberous heads: the stems rise three or four feet in height; are round, grooving, hollow, and terminated with flowering panicles, contracted and disposed crosswise. The leaves are larger at the base of the stem, decreasing in size towards the summit; opposite, connate,

[1] A vile, stimulant nostrum, consisting, according to Dr. Paris (*Pharmacologia*) of equal parts of *balsam of Tolu,* and the *compound tincture of benzoin,* with double the quantity of *rectified spirits of wine,* is sold under the name of *Essence of Coltsfoot,* as a remedy for coughs.

[2] *Mat. Med.* ii. 160.

[3] *Sibthorp, Flora Græca,* p. 24. t. 33. Dr. Smith, the learned editor of Sibthorp's work, says, "Hæc est vere *φου* Dioscoridis, a nemine botanicorum recentiorum ante Sibthorp detecta." Willdenow's 7th species, V. *phu,* which was supposed to be the plant of Dioscoridis, does not accord with his description, whereas that of Sibthorp corresponds with it in every particular.

and bearded at the base below; pinnatifid, with a terminal leaflet a little larger than the rest; all the segments are deeply veined and serrated, of a dark-green colour on the upper surface, and pale underneath. The flowers are small, in corymbose panicles, odorous, and interspersed with lanceolate, connate, bearded, waved, pale bracts; the calyx is a slight involute margin at the top of the germen during flowering, but afterwards unrolling into a plumous deciduous pappus: the corolla is tubular, white with a shade of pink, divided at the margin into five reflected, obtuse segments: the stamens are three-spreading with the corolla, and support round, yellowish anthers: the style is shorter, with a trifid stigma; and the capsule, crowned with the feathery pappus, is purplish at the base, and contains one oblong, ovate, compressed seeds.

The roots of valerian should be dug up in autumn when the leaves decay, or in spring before they expand; and be preserved in a dry place. Those plants which grow wild on a calcareous soil are preferable to those that are cultivated. They lose three-fourths of their weight by drying. Cats are allured and delighted with the odour.[1]

Qualities.—Valerian root consists of a tuberose rhizome, and many fibrous radicles, which have a strong, peculiar, unpleasant odour, and a warm, bitter, subacrid taste. Trommsdorff has chemically examined the root, and found it to contain 1·2 per cent. of *volatile oil*, 12·5 *resinous extractive*, 9·4 *gummy extractive*, 6·2 *resin*, and 70·7 of *lignin*. Its virtues appear to depend on the volatile oil, which is very liquid, and of a greenish-white colour, and from its odour and taste seems to contain much camphor. Twenty-two pounds of the dried root should yield eighteen and a half drachms of oil.[2]

Oil of Valerian is a yellowish viscid oil, lighter than water, becoming darker coloured by exposure, of a very powerful odour; when fresh it appears not to contain any valerianic acid, but by exposure to air this acid is generated, and more readily under the influence of an alkali. It consists of at least three compounds: 1st, *Valerole* ($C_{12}\,H_{10}\,O_2$); this body yields valerianic acid by oxidation: 2nd, *Bornéene* ($C_{10}\,H_8$), which resembles the fluid obtained by the distillation of Borneo camphor, is isomeric with oil of turpentine, and which, sometimes, by assimilating the elements of water, becomes solid and crystallizable, resembling Borneo camphor (C_{20}

[1] Mr. Lambert has endeavoured to prove, that the Valeriana *iatamansi* a Nepalese alpine plant, is identical with the spikenard of the ancients. This root is fusiform, about the thickness of the human finger, and bearing on the upper part, articulations covered with dense fibres, which give them somewhat of the appearance of the tails of animals. Vide *Illustrations of the Genus Cinchona*, &c., 4to. Lond. 1821. 177.

[2] *Central. Blatt.* June, 1836.

$H_{18} O_2$): 3rd, *Valerianic Acid* ($C_{10} H_9 O_3 + HO$); for properties, see *Sodæ Valerianas,* Part III.

It always contains, at first, some valerianic acid, from which, however, it is readily freed by distillation with magnesia. Its specific gravity at 77° Fahr. is 0·934. The expressed juice of the root contains *starch, extractive,* and *gum:* while the roots deprived of this juice yield a portion of black-coloured resin, but consist chiefly of woody fibre.[1] The active matter of valerian root is extracted by boiling water, alcohol, and solutions of the pure alkalies.

Medical properties and uses.—Valerian root is a powerful excitant antispasmodic, tonic, and emmenagogue, operating chiefly on the nervous centres. In large doses it causes agitation, exaltation of the mental faculties, and symptoms of intoxication. It is advantageously employed in hysteria, symptomatic epilepsy, hemicrania, and other affections depending on a morbid susceptibility of the nervous system. I have found it exceedingly serviceable in hypochondriasis; and it is regarded as a useful adjunct to cinchona in intermittents[2]; and, also, in low fevers. It may be exhibited in substance combined with a small portion of *mace* or *cinnamon;* or in the forms of infusion or tincture. The extract is a bad form of preparation. The dose of the powdered root may be from gr. x. to ʒ j., given three or four times a day.

Officinal preparations.—*Infusum Valerianæ,* L. D. *Tinctura Valerianæ,* L. E. D. *Tinctura Valerianæ composita,* L. *Tinctura Valerianæ ammoniata,* E.

VERATRIA. See *Veratrum,* and Part III.

VERATRUM. *Spec. Plant. Willd.* iv. 895.

Cl. 23. *Ord.* 1. Polygamia Monœcia. *Nat. ord.* Melanthaceæ.
G. 1859. *Hermaphrodite. Calyx* none. *Corolla* six-petalled. *Stamens* six. *Pistils* three. *Capsules* three, many-sided.
——— *Male* the same. Rudiment of a pistil.
Species 1. *V. album.*[3] White Hellebore. *Med. Bot. 3d edit.* 753. *t.* 257. *Hayne,* xiii. 26.
Officinal. VERATRUM, *Lond. Edin.* Rhizoma. White Hellebore rhizome.

Syn. Hellébore blanc (*F.*), Wiesse Niesswurzel (*G.*), Zwartbloemige nieswortel (*Dutch*), Hvit Prustrot (*Swed.*), Elleboro bianco (*I.*), Veratro blanco (*S.*) Helliboro branco (*Port.*), Tschemeritza (*Russ.*).

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[1] *Annales de Chimie,* lxx. 95. *Thomson's Chymistry,* 5th edit. iv. 225.
[2] Its employment was renewed in modern times by Fabius Columna, who received personal benefit from it in epilepsy. Experience has not confirmed its value in that disease.—*Murray, App. Med.* i. 275.
[3] Ελλεβορος λευκος Dioscoridis.

Veratrum is a native of the mountainous parts of Greece, Italy, Switzerland and Russia. Those specimens which are cultivated in our gardens flower in July. The root is a perennial rhizome, fleshy, fusiform, truncated, and beset with strong fibres; the stem is thick, round, hairy, erect, three or four feet in height, and branching. The leaves are oblong-ovate, about ten inches long, and five broad in the middle; plaited longitudinally, embracing the stem at the base, and of a yellowish-green colour. The flowers are polygamus, in a long, terminal, spike-like panicle, composed of small alternate spikelets, each accompanied with a lanceolate bract: the flower consists of six persistent petals, of a pale-green colour; three of them oblong and lanceolate, with a membranous edge; and three calycinal, which enclose the other three in the bud, one half shorter and heart-shaped, with a small point at the apex: the filaments closely surround the germen, diverge and bend down at the summit, and are terminated by yellow, quadrangular anthers: the germens are three in each hermaphrodite flower[2], oblong, with erect, bifid, hairy styles, crowned with flat, spreading stigmas: the capsules contain many compressed, membranous seeds.

Although the rhizome only is officinal, yet every part of the plant is extremely acrid and poisonous.

Qualities. — The recent root has a strong, disagreeable odour, and a bitterish, very acrid, permanent taste; but the odour is lost by drying. The dry root, as found in the shops, is sliced, the thick part transversely, and the fibrous longitudinally. The pieces have a dry, corrugated, yellowish-grey appearance, and break with a short starchy fracture. They are inodorous, and have a slightly bitter taste. When very light and spongy they must be rejected. According to MM. Pelletier and Caventou white hellebore owes its medicinal properties to *gallate of veratria.* The following are the components of white hellebore, according to their analysis: — A fatty matter composed of *elaïne, stearine,* and a *volatile acid, acidulous gallate of veratria,* a *yellow colouring matter, starch, gum,* and *lignin.* According to Simon, two other bases, called *jervin* and *barytin,* are contained in this rhizome, the composition of the latter has been stated to be represented by the formula $C_{60}\ H_{45}\ N_2\ O_5$.

Probably the *veratric acid* is contained in this rhizome as well as in the sabadilla seeds. For properties of *Veratria,* see Part III. (Alkaloids).

A decoction of the rhizome is coloured olive-green by the sesqui-salts of iron; and forms precipitates with nitrate of mercury, the acetates of lead, and astringent vegetable decoctions and infusions. Iodine forms in it the iodide of amidine.

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[1] The hermaphrodite flowers are generally on the upper, erect spike.

Medical properties and uses.—White hellebore is a powerful acrid cathartic, an emetic, and a sternutatory. When taken internally, even in moderate doses, its operation is violent and dangerous; producing, besides hypercatharsis, with bloody stools and excessive vomitting, great anxiety, tremors, vertigo, syncope, sinking of the pulse, cold sweats, and convulsions, terminating, if the dose be large, in death. Its external application to an ulcerated surface also produces griping and purging. Notwithstanding these effects, veratrum has been exhibited internally, and with advantage, in mania, epilepsy, scabies, lepra, and obstinate herpetic eruptions.[1] It was proposed by Mr. James Moore to be given in gout instead of the eau medicinale, the active principle of which was then unknown.[2] But the most ordinary use of white hellebore is as a local stimulant; either as an adjunct to errhine powders in lethargic cases and gutta serena, or in the form of decoction as a wash, or mixed with lard as an ointment, in scabies and herpetic eruptions. In every form, however, it requires to be used with caution; and even as an errhine, its acrimony should always be obtunded by mixing it with some mild powder, as that of liquorice root or of starch. The dose of the powdered root should not exceed grs. ij.; and for errhine purposes grs. ij. or iij. should be diluted with grs. xij. of liquorice powder, and a pinch of it snuffed up the nose for several successive evenings. When taken internally as a poison, the best antidote is a strong infusion of nut-galls.

Officinal preparations.—*Decoctum Veratri*, L. *Vinum Veratri*, L. It is contained in Unguentum Sulphuris compositum, *L.*

VINUM. Wine.

Officinal. VINUM XERICUM, *Lond.* VINUM ALBUM, *Edin.* VINUM ALBUM HISPANICUM, *Dub.* Sherry Wine.

Syn. Vin d'Espagne (*F.*), Wein (*G.*), Wyn (*Dutch*), Win (*Swed.*), Vino (*I.*), Vino de Xerez (*S.*), Khmur (*Arab.*), Bāde (*Pers.*), Dakh ramudh (*H.*).

Although the British Colleges have designated *Sherry* only, yet all the generous wines are occasionally used as medicinal agents, and, therefore, we shall take a general view of the manufacture, characters, and properties of wine.

In the wine countries, when grapes are fully ripe, they are gathered, and immediately subjected to the press, by which the juice is separated from the skins and seeds. In some places the grapes are previously picked from the stalks, the sound being separated from all the unsound with great care[3]: in some they are

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[1] *Medical Communications*, i. 297. [2] See *Two Letters to Dr. Jones*, 1811.
[3] This is the case at Madeira; and also at Epernay, where the best champagne is

pressed just as they are gathered from the vines; and in other places they are almost converted into raisins before they are pressed.[1] The expressed juice is called *must*, and contains all the principles which we enumerated above as being present in the grape; these, when the vats holding the *must* are placed in a temperature of 70°, begin to act upon one another, the liquor becomes turbid, an intestine motion is evident in it, its temperature increases, a scum collects on its surface, and carbonic acid gas is disengaged. This is the process of vinous fermentation. In a few days its activity gradually decreases, the scum and impurities subside to the bottom; and the liquor clears, having lost its saccharine taste, and become *wine*. It is then put into barrels, and, in a short time afterwards, is racked off into other casks, and undergoes the operation of sulphuring, or burning sulphur matches in the cask, which, extricating sulphurous acid, renders the glutinous matter of the wine less susceptible of further fermentation. It is then clarified; and in due time put into bottles, in both of which kind of vessels the fermentation is slowly continued, although in an imperceptible degree; nor is it altogether completed till the wine attains the utmost limits of its age, and passes into the acetous fermentation. All the principles of the *must* are perhaps required for the production of wine; but the saccharine matter, the gluten, and the vegetable acid, are essential; and on the proper quantity of the first in particular, and the manner in which the fermentation is conducted, depend the strength and goodness of the wine. When the sugar is in too great quantity, and not completely decomposed, or the fermentation is checked, the wine retains a sweet taste; a more proper proportion and perfect decomposition, with a brisker fermentation, render it strong and spirituous; but if the quantity of sugar be small, and at the same time there is a deficiency of tartar in the *must*, a thin and weak wine is produced. When it is bottled early it becomes brisk and sparkling; and it is rough and astringent when the fermentation has been conducted on the skins, particularly on those of the coloured grapes; which also gives colour to the wine; for when the juice only is fermented, white wines are produced from coloured grapes.

Wine that has been too long fermented before being put into the casks, is very apt to become sour; and occasional oxides of lead, as litharge and white lead, are employed to correct the acidity. According to Fourcroy, these form a soluble triple salt, an aceto-tartrate of lead, by uniting with the acetic and tartaric acids in

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made. In Madeira, every kind of grape which the island produces, except the malmsey and the sercial, are pressed together for making the wine which bears the name of the island.

[1] The wine of Chio, which was esteemed by the ancients for its strength, sweetness, and exquisite aromatic flavour, is made from nearly dried grapes.

the wine[1]; which, daily experience shows, produces violent colic, and other deleterious effects on those who drink it. The fraud may be detected by means of a solution of sulphuretted hydrogen gas, which will produce a black precipitate if lead be present, as has been already explained (see *Plumbum*). Sherry is said to be coloured by burnt sugar, or *caromel*, and sometimes by *must* boiled down to one-fifth of its original bulk. Port wine is often adulterated, and coloured with dye-stuffs; and elderberry juice and kino are added to give it roughness. Solution of potassa detects some of the artificial admixtures of wine. It precipitates the natural principles of wine, green; berries of yebb, violet; Indian wood, violet; red mulberries, violet; Brazil wood, red; beet, red; litmus, clear violet; myrtle-berries, winelees colour; elder-berries, bluish. But besides those articles already mentioned, both arsenic and corrosive sublimate have been used for fining wines. Nitrous ether is sometimes employed to perfume wines.

Qualities. — Various circumstances, such as climate, soil, and the mode of conducting the fermentation, modify the flavour and taste of wine. The odour and flavour in the more fully-fermented wines, seems to depend on the vinous process, as it bears little resemblance to the natural flavour of the fruit; from which, however, in the sweet and half-fermented wines, it is immediately derived; but flavouring ingredients, as bitter almonds and orris root, are also used in the manufacturing of wines. Malaga, Frontignac, Tokay, Vino tinto, Montefiuscone, Schiras, and the Malmsey wines of the Greek islands, are sweet to the taste, and consequently the result of imperfect fermentation; Champagne, Gooseberry, and all sparkling wines, owe their briskness to carbonic acid gas: Hock, Rhenish, Mayne, Barsac, Burgundy, Claret[2], and Hermitage contain a certain quantity of uncombined acid, and are termed light and dry; while Marsala, Madeira, Sherry[3], and Port, are dry and strong. The odour of *sherry* is pleasant and aromatic; the taste warm, with some degree of the agreeable bitterness of the peach kernel; the taste of *port* is austere and bitterish: *claret* is less rough, thinner, slightly acidulous, and higher flavoured; and *hock*, although frequently acidulous, yet, when good, is free from acid. Of the common white wines, *marsala* is undoubtedly the strongest. But notwithstanding these and other differences,

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[1] *Annales de Chimie*, vol. i. p. 76.

[2] The best claret is made from grapes grown at Château Margaux. The following quotation proves that it was known in England in the 13th century. Vinum, tam album quam rubrum, *claritum*, medinum, &c., were claimed by the monks of Winchester, on festivals in 1285. — *Regist. Priunt. S. Smith, Winton MS. quoted in Warton's Hist. of Poetry*, 4to. vol. i. p. 425.

[3] The sherry, or sherrish-sack of Shakspeare's time, may mean, as Dr. Henderson supposes, the *dry* or *sec* wine of Xeres; or, if it was the first wine exported from Spain, the term sack, in my opinion, may have been given to it from that circumstance, *vino sacco*, in Spanish, signifying export wine.

the essential components of all wines, are the following: — One or more *acids*, generally the *malic*, but in some the *carbonic* predominates, and all of them contain some *tartaric; extractive matter*, which in old wines is deposited with the tartar; a *volatile principle* on which the flavour depends; *colouring matter;* and *alcohol*, the most important of the ingredients, and that one on which their dietetic and medical properties depend. Gay Lussac has proved that this principle is ready formed in wine, and not, as Fabroni supposed, the result of its distillation. All wines appear to contain an ether, called *Œnanthic ether*, which gives them their *vinous odour.* It is composed of œnanthic acid and ether. Besides this ether, certain wines contain other and different ethers, to which their peculiar bouquet is due; thus old Rhine wine contains *acetic ether*, and many other wines small quantities of *butyric ether.* Œnanthic ether appears to be the result of fermentation, and has not been detected in the grape.[1] The following table is intended to show the average quantity, by measure, of *alcohol, oily, unctuous, resinous,* and *gummy* matter contained in several wines, which were examined by Neumann.

[1] Liebig's familiar Letters on Chemistry in its relations to physiology, dietetics, &c. 1851.

A Quart of	contains of											
	highly rectified Spirit.		*thick, oily, unctuous, resinous Matter.*			*gummy and tartareous Matter.*			*Water.*			
	℥.	ʒ.	℥.	ʒ.	grs.	℥.	ʒ.	grs.	℔.	℥.	ʒ.	grs.
Aland - - -	1	6	3	2	0	1	5	0	2	5	3	0
Alicant - -	3	6	6	0	20	0	1	40	2	2	6	0
Burgundy -	2	2	0	4	0	0	1	40	2	9	0	20
Carcassone -	2	6	0	4	10	0	1	20	2	8	4	30
Champagne -	2	5	0	6	40	0	1	0	2	8	3	0
French - -	3	0	0	6	40	0	1	0	2	8	0	20
Frontignac -	3	0	3	4	0	0	5	20	2	4	6	30
Vin de Grave	2	0	0	6	0	0	2	0	2	9	0	0
Hermitage -	2	7	1	2	0	0	1	40	2	7	5	20
Madeira - -	2	3	3	2	0	2	0	0	2	4	3	0
Malmsey - -	4	0	4	3	0	2	3	0	2	1	2	0
Vino de Monte Pulciano	2	6	0	3	0	0	2	40	2	8	0	20
Moselle - -	2	2	0	4	20	0	1	30	2	9	0	10
Muscadine -	3	0	2	4	0	1	0	0	2	5	4	0
Neufchatel -	3	2	4	0	0	1	7	0	2	2	7	0
Palmsec - -	2	3	2	4	0	4	4	0	2	2	5	0
Pontac - -	2	0	0	5	20	0	2	0	2	9	0	40
Old Rhenish -	2	0	1	0	0	0	2	20	2	8	5	40
Rhenish - -	2	2	0	3	20	0	1	34	2	9	1	6
Salamanca -	3	0	3	4	0	2	0	0	2	3	4	0
Sherry - -	3	0	6	0	0	2	2	0	2	0	6	0
Spanish - -	1	2	2	4	0	9	4	0	1	10	6	0
Vino Tinto -	3	0	6	4	0	1	6	0	2	0	6	0
Tokay - -	2	2	4	3	0	5	0	0	2	0	3	0
Tyrol, red -	1	4	1	2	0	0	4	0	2	8	6	0
Red Wine -	1	6	0	4	40	0	2	20	2	9	3	20
White - -	2	0	0	7	0	0	3	0	2	7	0	0

Mr. Brande, Dr. Prout, M. Zez, and Dr. Christison, have prosecuted this inquiry with more accuracy. In the following table the quantity of alcohol of specific gravity ·825, in 100 parts of wine, is given on the authority of the experiments of three of these distinguished chemists.

Table of the Principal known Wines, and of the Quantity of Alcohol in Wines.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
Portugal...	*Red.* Port.......	...............(average)	22·96 B.[1]	
		Vinho de Ramo......	15·62 P.	Deep purple; rough; bitter sweet; spirituous.
		Collares...............	19·75 P.	
	White. Bucellas	....	18·49 B.	
	Setuval ...	....	—	Pale straw; flavour delicate.
	Carcavellos	....	18·65 B.	Amber colour; sweet.
Spain.......	*White.* Sherry ..	....	19·17 B.	Deep amber colour; nutty and aromatic.
		Amontillado		
		Paxarete..............	—	Amber colour; sweet, and aromatic.
	Malaga....	...........(A. D. 166)	18·94 B.	
		Pedro Ximenes......	—	Amber colour; flavour delicate, rich, sweet.
		Lagrima de Malaga	—	Colour deeper; sweet, luscious.
	Malmsey of Sitges Priory	....	—	Resembles Malaga.
	Red. Tent, *Tintilla*.......	....	13·30 B.	Purple; sweet; flavour strong, spicy.
	La Torre... Peralez...... Segorve..... Vinaroz ..... Benicarlo... Carinena ...	....	—	Sweet.
	Val de Penas Manzanares Ciudad Real	....	—	Resembles claret.
Majorca ...				
France	*White.* Alba flor	....	17·26 B.	Resembles Sauterne.
	Champagne	Sillery...................	13·30 B.	Still, of an amber colour.
		Ay, Hautvilliers, Epernay, Dizy, Avenay, Avise, Oger, Pierry, Closet, Lemesnil, Cramont, Menil	—	Brisk or sparkling; delicate flavour and aroma; slightly acidulous; but some are still, or, at most, simply creaming; generally paler than Sillery.
	Red. Champagne	Verzy..................	11·93 B.	
		Verzynay Mailly, Bouzy, St. Basle, Chamery, Ecueil Villedemange........	—	Good colour and body, and a high, agreeable flavour.
		Clos St. Thierry......	—	Colour and aroma of Burgundy, with lightness of Champagne.
	White. Arbois Papillon Chablis	....	—	Inferior to Champagne, but resembling it in some of their qualities.

[1] B. means on the authority of Mr. Brande; P. of Dr. Prout; and Z. of M. Zez.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
France......	*Red.* Burgundy	....	14·57 B.	
		Romanée Conti, Clos-Vougeot, Chambertin, Richebourg, Romanée de Saint Vivant, Tache, St. George..............	—	Beautiful, rich, purple colour; exquisite flavour, with a full body, yet delicate and light.
		Volnay, Pomand, Corton, Vosne, Nuits, Beaune Chamboll, Morey, Meurseault, Savigny-sous-Beaune..............	—	Excellent wines, but inferior to the former.
		Romaneche, Torins, Chenas, Tonnere, Auxerre..............	—	Strong generous wines.
	White. Burgundy	Mont Rachet.........	—	High perfume and nutty flavour.
		La Perrière, la Combotte, la Goutte d'or, la Genévrière, les Charmes, Vaumorillon, les Grisées, Valmur, Grenouilles, Vaudesir, Bougnereau, Mont de Milieu, Fuissey, Pouilly..............	—	Rich, high-flavoured wines.
	Red. Hermitage	....	32·2 B.	Dark purple colour; flavour exquisite, and perfume resembling that of the raspberry.
		Meal, Greffieux, Basas, Beaume, Raucoule		
		Crozes, Gervant, Mereceurel..............	—	Less delicate in flavour.
	White. Hermitage	Vin de paille....	17·43 B.	Amber colour; sweet, luscious.
	Côte Rotie	....	12·32 B.	Resemble Hermitage in flavour, but are weaker.
		Verinay................		
	Seyssuel...	....	—	Violet perfume.
	Clarette of Die......	....	—	Light, sparkling, delicate.
	Red. Tavel....... Chuzlan..... Beaucaire...	....	—	Bright rose colour; flavour and aroma delicate.
	St. Geniez... Lirac........ St. Laurence St. Joseph... St. George's	....	—	Inferior.
	Cornas......	....	—	Full rich colour; flavour of Ratafia.
	White. Vin de Cotillon	St. Peray, St. Jean	—	Sprightly; colour of the violet.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
France	*White.* Frontignac	....	12·79 B.	Luscious; flavour of the grape.
	Lunel.......	Clos-Mazet............	15·52 B.	Bright yellow colour; less luscious than Frontignac.
	Beziers......	Cazoul, Bassan........	—	Resembles Sherry.
	Red. Rousillon	.... (average) Bagnols sur Mer, Cosperon, Collioure, Toremila, Grenache, Terrato	18·13 B.	Great body and colour; becomes tawny when old.
	White. Rousillon	Rivesaltes..............	—	Bright golden colour; fragrant aroma; flavour of the quince.
		Salces (*Maccabac*)	—	Similar, inferior to Rivesaltes.
		....	21·24 P.	Red; somewhat rough; sweet.
	Red. Claret...	.... (average)	15·10 B.	
		Lafitte, Latour, Leoville, Château Margaux, Rauzan.......	—	Deep purple; delicate flavour; violet perfume
		(*Graves*) Haut Brion, Haut Talanu, Merignac (average) *Artimino*[1], *Kissanos*[2]	13·37 P.	Resemble the better sorts of Burgundy, but are rougher.
		Gorce, Larose, Branmouton, Pichow, Longueville.........	—	Light wines; of good flavour.
		St. Emilion, Canon...	—	Harsh; odour of burning sealing-wax.
	White. Claret...	Preignac, Beaumes, Langon, Cerons, Buzet................	—	Secondary quality.
		St. Nessans, Sancé, Mont Basillac......	—	Sweet.
	Barsac...	....	13·86 B.	Amber colour; full; aroma somewhat like cloves.
	Sauterne	....	14·22 B.	Amber colour; sweetish.
Germany ..	*White.* Rhenish	Johannisberger (1788)	8·7 P.	High flavour and perfume.
		Steinberg...............	—	Strongest of the Rhine wines; sweetish.
		Rüdesheimer (1811) Grafenberg............	10·72 B.	Like the former.
		Markebrune Rothenberg	—	Soft and delicate flavour.
	Red. Rhenish.	(Hock) Hocheimer (average)............	13·68 B.	Light; acidulous.
		Amanshausen, Leibfranenmilch, Scharlachberger...........	—	Considerable body.

[1] A Tuscan wine. [2] A Canadian wine.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
Germany..	*Red.* Rhenish....	Laubenheim, Nierstein..................	—	Light; delicate perfume and taste.
		Bodenheimar (1802)	13·96 Z.	Delicate perfume and taste.
	Moselle...	Braunenberg, Pisport, Zeltingen, Wehlen Graach..............	—	Light pleasant flavour; high aroma.
Hungary...	Tokay............	....	9·88 B.	Brownish yellow when new, greenish when old.
		Tokay Essence........	—	Syrupy, thick, muddy.
		Ausbruch...............	—	Thinner, and more vinous.
		Maslas...................	—	Inferior to the two former.
	Ménser............	Ædinburg, Rusth, Ofen...............	—	Sweet; resembles Tokay.
Russia......	Don Wine.......	....	....	A white wine.
Italy	Montepulciano..	....	22·	Sweet, with high flavour.
		Aleatico...............	16·20 P.	Brilliant purple; luscious aromatic flavour.
	Verdea...........	....	—	Greenish colour and high flavour.
	Trebbiano........	....	—	Golden colour; sweet.
	Albano............	Montefiascone.........	—	Pale straw-colour; light.
	Orvietto	....	—	Both red and white; light.
	Lacrima Christi	....	19·70 B.	Red, luscious, sweet.
		Monte Somma, Gallite	—	The best Lacrima.
		Ischia, Nola, Ottajano, Novella, Torre del Greco, Pozzuolo.................	—	Second-rate wines.
	Vino Greco......	....	—	Sweet.
Sicily.......	Marzala...........	.... (average)	25·9 B.	
		Twenty-one years old, submitted to Soemmerring's process five years............	18·40 P.	Resembles Madeira.
	Syracuse..........	....	15·28 B.	Both red and white
	Etna...............	....	30·00 P.	Resembles Madeira, with the harsh flavour of Sicilian brandy.
	Lissa..............	....	15·90 P.	Resembles Claret.
Ithaca......	Red wine of Ithaca.......	....	—	Hermitage flavour.
Cephalonia	Cephalonia.......	....	—	A dry red wine.
Candia......	Rithymo.........	....	—	A fine-flavoured white wine.
Cyprus	Vino Santo.......	....	—	Pale straw-colour; sweet.
Tenos........	Tenos.............	....	—	Luscious, sweet.
Tenedos....	Red Muscadine	....	—	Resembles Tokay.
Smyrna	White Muscadine	....	—	Luscious, sweet.

Where produced.	Generic Names.	Varieties.	Quantity of Alcohol of spec. grav. ·825 in 100 parts.	Qualities.
Madeira ...	Madeira	...............(average)	22·27 B.	Full; pungent, nutty, or bitter-sweet, rich, aromatic flavour.
		.........(West Indies)	21·20 P.	
		Sercial ......(average)	20·32 B.	
		Malmsey[1]...............	16·40 B.	Luscious, sweet.
Teneriffe...	Teneriffe	....	19·79 B.	Resembles Madeira.
Cape of Good Hope	Constantia	....	14·50 P.	Sweet, luscious, pungent.
		Red Constantia	18·92 B.	
		White Constantia ...	19·75 B.	
	Steen Wine......	....	10·60 P.	Resembles Rhenish.
	Cape Muschat...	....	18·25 B.	Sweet.
	—— Madeira ...	...............(average)	20·51 B.	Harsh, earthy taste.
Persia......	Shiraz	White	19·80 P.	Yellow, or topaz colour; sweetish; resembles Madeira.
		Red	15·52 B.	Resembles Tintilla, with a pitchy taste.
England...	Grape wine	....	18·11 B.	Resembles Rhenish.
	Rasin wine	...............(average)	25·12 B.	
	Currant wine ...	....	20·55 B.	Various.
	Gooseberry wine	....	11·84 B.	Brisk, like Champagne.
	Elder wine	....	9·87 B.	Thick, narcotic.
	Orange wine ...	....	11·26 B.	Sweet, luscious, flavour of the fruit.
	Cyder	....	9·87 B.	
	Perry	....	7·26 B.	
	Mead	....	17·32 B.	Sweet.
	Sycamore wine	*juice fermented with sugar.*		
Barbary ...	Usuph	*water in which rasins are steeped.*		
Nepaul ..	Sihee	*a grape wine.*		Strong and harsh.
Hindostan	Tari	*fermented juice of the Palmira tree, Borassus, flabelliformis, Callu, Teildy, Saura.*		
	Sinday	*fermented juice of Elate sylvestris, the wild date.*		
China	Cha	*nearly the same as Tari.*		
	Mandurin	*boiled rice, fermented.*		
Tartary ...	Koumis	*fermented mare's milk.*		
	Airen	*fermented cow's milk.*		
	Kanyangtsyen	*the flesh of the lamb fermented with rice and other vegetables.*		
Africa......	Millaffo	*fermented juice of the palm-tree, Congo.*		
	Pombie	*fermented millett, Caffres.*		
Brazil......	Kooi	*fermented juice of Apples.*		
Mexico ...	Palque.........	*fermented juice of the Agave Americana.*		
Norway ...	Birch wine ...	*juice of Betula alba fermented with sugar.*		

[1] This name is derived from *Malvasia*, a town in the Bay of Epidaurus Limera, in the Morea, whence the grape was originally derived, but now producing no good wine.

Medical properties and uses.—Wine when good, and of a proper age, is cordial and tonic; but when new, it is flatulent and purgative, and it intoxicates sooner than old wine. In a dietetical point of view, the temperate use of wine promotes digestion, and gives additional energy to the action of the heart, strengthens the animal functions, exhilarates the spirits, sharpens the wit, and calls into action all the intellectual powers: but when taken in excess, it intoxicates, producing sickness, headache, vertigo, and diarrhœa, with nervous tremors, which continue for two or three days; and, like ardent spirit, its habitual excessive use extinguishes the faculties of both body and mind, producing dyspepsia, emaciation and debility, hepatic and pulmonary inflammation, palsy, gout, dropsy, delirium, tremors, and a long train of diseases and wretchedness. We nevertheless hear of very extraordinary quantities of wine being drunk with impunity by some individuals. I knew a man who had not retired sober to bed for twenty years, and yet lived to upwards of eighty years of age.[1] Drunkenness, however, is the vice of barbarians; and, as nations merge from that state, it evidently becomes less prevalent. In Britain it is now happily confined to the dregs of the people.

As a remedy, wine is stimulant, tonic, and antispasmodic. Its stimulating properties are less diffusible, but more permanent, than alcohol; and hence its dose is more easily regulated, and its effects are more certain. In all diseases accompanied with much debility, such as cases of extensive ulceration or gangrene, and in the sinking stage of typhus fever, wine is not only the best addition to cinchona bark and opium, but it is a remedy on which alone there is much reliance; in some convulsive affections, as symptomatic tetanus and chorea, great benefit has been derived from its use; and, in the convalescences from all severe diseases, it is the most efficacious and the quickest mean we can employ for restoring the exhausted strength and vigour. Wine operates less powerfully on the system in a state of disease than in health; the quantity, however, to be given, and the proper period of exhibiting it, require to be regulated with much judgment. The skin being open, and not dry nor hot, the strength sinking, and the ulcerations, if any exist, assuming a gangrenous appearance, indicate the use of wine; and when, in the event of the pulse being low and fluttering, wine restores its firmness without increasing delirium, and induces sleep, it may be given with a confidence of the greatest benefit. But if, on the contrary, it renders the pulse quicker, increases heat, thirst, delirium, or watchfulness, its exhibition ought immediately to be discontinued. The quantity to be

[1] The Emperor Maximin could quaff six gallons of wine at a sitting; and a Mr. Vanhorn, of modern notoriety, drank, in the course of twenty years, 35,688 bottles, or 50 pipes of red port. In the reign of Henry the Eighth, wine and beer were used at breakfast, and the quantity served to one person was a pint of each.

given depends entirely on the nature of the disease, and the intentions for which it is administered. In typhus, the proper rule is to give it till the pulse fills, the delirium abates, and the extremities warm; and it should be repeated on the smallest appearance of stupor, quick and sinking pulse, or tremor.[1] A few glasses, and these even diluted with water, given in the space of twenty-four hours, will often produce all that is required from wine; but sometimes very large quantities are necessary. In a case of symptomatic tetanus, mentioned by Currie[2], five bottles of Madeira wine were taken every day for some time, without producing the least symptoms of inebriety, or morbidly exciting the pulse; but, on the contrary, with the utmost advantage in allaying irritation, and relieving the patient. In ordinary cases of fever, however, wine is, perhaps, in general, too freely given, so as to occasion exhaustion instead of supporting strength.

In a dietetical point of view, wine is useful or prejudicial, in proportion as the fermentation is more or less perfect. In wines containing the malic acid, when the fermentation has been imperfect, it is recommenced in the stomach, and much carbonic acid and other gases are evolved which, distending that organ, oppress the individual; and if he be dyspeptic, produce depression of spirits and all the horrors of hypochondriacism. When wine, however, is good, and taken in moderation, it stimulates gratefully the nerves of the stomach, and, consequently, promoting a more healthy secretion of the gastric fluid, assists the chymification of the food. *Sweet wines* are more apt to become ascescent than dry wines; but it is erroneously conjectured that the same objection applies to the use of the *Rhenish wines;* for, as these wines contain much free tartaric acid, and scarcely any malic acid, they are less liable to ferment than many of the stronger wines. Sparkling, brisk wines, such as *Champagne,* although they possess little more than half the quantity of alcohol contained in Port wine, yet intoxicate more speedily than other wines, but the morbid excitement is of short duration, and the subsequent exhaustion is comparatively trifling. They are said to induce gout in those strongly predisposed to that disease; but, probably, more is to be attributed to the luxurious dishes which generally accompany the use of Champagne, than to that exhilarating beverage. In febrile habits, *Burgundy, Port,* and the stronger white wines, are to be avoided; but in diseases of debility, particularly where the stomach requires the aid of a tonic, these wines will prove beneficial. In convalescence, however, from acute diseases, if wine be admissible, *Claret* or some of the better kinds of Rhine wines — for example, *Moselle* or *Hock* — are preferable; and this is particularly the case, if, with a low pulse and much exhaustion, the nerves are so excitable as to

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[1] *Moore's Medical Sketches.*

[2] *Reports on Water,* i. 174.

produce a febrile action in the arterial system, on the application of stimulants, either corporeal or mental. In those who have a disposition to obesity, the Rhine wines, on account of their diuretic properties, are preferable to every other kind for daily use. Where health abounds, wine is altogether unnecessary: but, as habit has rendered the use of it general, it is to be lamented that, in this country, the high prices of the more wholesome kinds force the great majority of the middle ranks to indulge in the use of those which contain too large a quantity of alcohol, and the lower classes to the abuse of spirituous liquors.

When wine is prescribed as a cordial in a state of convalescence from acute diseases, or in a weakened condition of the habit, it should not be taken with dinner or any other meal, but at noon, upon an empty stomach. As a medicinal agent in convalescence no wine is superior to good, sound claret; and, if really good, it displays little or no acidity.

Wine is, sometimes, employed as a local excitant, as for example, two parts of Port wine and one of water form a good injection in hydrocele, after evacuating the fluid from the scrotal sac.

Officinal preparations.—*Vinum Aloës*, L. E. *Vinum Colchici*, L. *Vinum Ferri*, L. *Vinum Gentianæ*, E. *Vinum Ipecacuanhæ*, L. E. D. *Vinum Tabaci*, E. *Vinum Opii*, L. E. D. *Vinum Rhei*, E. D. *Vinum Antimonii Potassio-tartratis*, L. *Vinum Antimoniale*, E. *Vinum Veratri*, L.

VIOLA. *Spec. Plant. Willd.* i. 1159.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Violaceæ.

G. 446. *Calyx* five-leaved. *Corolla* five-petalled, irregular, horned at the back. *Anthers* cohering. *Capsule* superior, three-valved, one-celled.

* *Stemless.*

Species 12. V. *odorata.*[1] Sweet Violet. *Med. Bot. 3d edit.* 251. *t.* 89. *Smith, Flora Brit.* 245. *Hayne*, iii. 2.

Officinal. VIOLA, *Lond. Edin.* The recent petals or flower of the violet.

Syn. Violette odorante (*F.*), Blaue veilchen; Marzvellchen (*G.*), Tamme Viool (*Dutch*), Marts fioler (*Dan.*), Akta fioler (*Swed.*), Viola Mammola (*I.*), Violeta (*S.*), Violetta (*Port.*), Pachutschaja fialko (*Russ.*), Kiet tuong hoa (*Chinese*).

This species of the violet is indigenous, growing in shady places, and flowering in March, April, and May. It is a low creeping plant, giving out runners, which root at small intervals, and send up tufts of leaves and flowers. The roots are fibrous: the leaves heart-shaped, with crenated edges, on slender footstalks; the upper surface of a lively green colour, the under paler and downy.

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[1] Ιαυ πορφυρουν Dioscoridis.

The flowers are supported on delicate, quadrangular, channelled flower-stalks, about two inches long, furnished with two small bracts, and curved at the summit; the calyx consists of five green leaflets, the two posterior of which are separated by the spur of the corolla: the petals have a deep violet colour, are white at the base, and irregular; the two lateral ones are bearded near the base; and the posterior, which is slightly keeled, has a large spur, enclosing glandular appendices of the corresponding anthers: the anthers are nearly sessile, whitish, flat, supporting orange-coloured, membranous expansions that cover the upper part of the germen; which is pyramidal, downy, and crowned with a falcated pistil.

For medicinal and chemical purposes, the sweet violet is cultivated in great abundance at Stratford-on-Avon: but the London herb-shops are supplied chiefly from Kent. As the petals only, separated from the calyx, are brought to market, it is difficult to detect the admixture of the viola *hirta*, an inodorous species, which is often practised. It is not, however, a matter of much importance.

Qualities. — Violets have an agreeable sweet odour, and a very slightly bitter taste. When chewed they tinge the saliva blue, and yield their colour and flavour to boiling water. The root, stem, leaves, flowers, and seeds yield an alkaline principle not unlike *emetina*, which M. Boullay, its discoverer, has termed *violin.*[1] It is, like *emetina*, a powerful poison.[2] It is united with malic acid in the violet, as emetina is with gallic in ipecacuanha. According to Pagenstecher, violets contain an *odorous principle*, *blue colouring matter*, *sugar*, *gum*, *albumen*, and salts of *potassa* and of *lime*.

Medical properties and uses. — The petals of the violet are gently laxative, and were formerly regarded as anodyne and pectoral; but they are now scarcely ever used, except for preparing the syrup, which is given occasionally as a purgative to infants. Their aqueous tincture, and the syrup, are useful and delicate tests of the presence of uncombined acids and alkalies: the former changing the blue colour to a red, the latter to a green. The infusion is not liable to change, if it be kept in a tin flask, well stopped. MM. Corte and Willemet, who employed the powdered roots to produce vomiting, found that that was fully effected by doses of two scruples.

Officinal preparation.—*Syrupus Violæ*, L. E.

VITIS. *Spec. Plant. Willd.* i. 1180.

Cl. 5. *Ord.* 1. Pentandria Monogynia. *Nat. ord.* Vitaceæ.

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[1] *Journn. de Pharm.* x. 23. [2] *Id.* Jan. 1824.

G. 453. *Petals* cohering at the apex, shrivelling. *Berry* five-seeded; superior.

Species 1. V. *vinifera.*[1] Common Vine. *Med. Bot. 3d edit.* 144. *t.* 57. *Duhamel, Arb.* ii. *t.* 1—6.

Officinal. UVA, *Lond.* UVÆ PASSÆ, *Edin. Dub.* Raisins. The prepared fruit.

Syn. Raisins secs (*F.*), Rosinen (*G.*), Groote razynen (*Dutch*), Russin (*Swed.*), Uva passa (*I.*), Passas (*S.*), Uvas Passadas (*Port.*), Zabib (*Arab.*), Kishmish (*H.*), Dividatsipalavuttil (*Tam.*), Velit chamoodika gheddie (*Cing.*), Mewuz (*Pers.*), Zebub (*Malay*), Guin-uydden (*Welsh*), Guin-bren (*Cornish*), Guin-ien (*Armorican*), Fien-ras (*Irish*).

The vine is a native of Armenia, Georgia, and the Levant; but is now found in most of the temperate regions of the earth, and is cultivated with care wherever its fruit can be brought to perfection. In France, the northern limit of the vine is stated to be 50° 20′[2]; in Thuringia, Saxony, and Siberia, it is 51°; but toward the east it is lower, for although Hungary has much wine, yet Gallicia has none; and in the southern parts of the Russian empire it ascends no higher than 48°. In America, the vine is cultivated in the southern States only, extending no farther north than 38°. The limits southward in the northern hemisphere is properly 15°; but in the high mountainous island of St. Thomas on the coast of Guinea, in Abyssinia, and in the Deccan, it is found almost under the equator. In the southern hemisphere, its southern limits are 37°. The greatest altitude, in 45° latitude, is 2460 feet; in the north of Switzerland, 1700 feet; on the Alpine range, 2000 feet; in Madeira, 2030 feet, in Teneriffe, 2500 feet; and on the Apennines and in Sicily, 3000 feet.[3] Its culture is supposed to have been introduced from the East, where it was reared, and wine made from the fruit, in the earliest ages[4]; and afterwards to have extended to Italy, about 600 years after the foundation of Rome, and thence to Burgundy in the time of the Antonines. It was introduced into Madeira, from the island of Cyprus, in the fifteenth century. In Great Britain the vine was cultivated before the year 731, when Bede finished his history; but

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[1] Αμπελος Græcorum.

[2] "In 1827, the quantity of vineyard land in France, was 4,265,000 acres, or one thirtieth part of the surface of that kingdom; the annual production of wine is 812,808,040 gallons; the vine-growers are about 1,800,000 in number; and the tax on the wine amounts to 2,900,000*l.* per annum. The wine is thus disposed of: — 198,000,000 of gallons are consumed by the proprietors; 141,680,000 are made into brandy; 91,344,000 lost and wasted among the growers, and 44,000,000 in the hands of the dealers; 24,530,000 exported; and 11,000,000 made into vinegar. The loss by evaporation is 12 per cent. on the small, and 5 per cent. on the large casks. — *Bowring's Report on the Commercial Intercourse between France and Great Britain.*

[3] See extract from Prof. Schowe's work on the Geography of Plants. *Edin. Phil. Journ.*

[4] We are told that Noah, after coming out of the ark, planted a vineyard; and "drank of the wine, and was drunken." — *Genesis,* chap. ix. ver. 20, 21.

although it was at one period brought to considerable perfection[1], yet, from the greater value of the ground for the cultivation of corn, and the wines produced in this country having never equalled those of the Continent, vineyards are now scarcely known in Britain. The vine, therefore, is cultivated for the dessert only, no raisins are made, and scarcely any wine.

The vine has a slender, twisted, climbing stem, covered with a rough, peeling, fibrous bark. The leaves are lobed, and sinuated, serrated, and placed alternately on long footstalks. The flowers, which appear in June and July, are small, and produced in clusters attended by tendrils: the calyx is very minute: the petals are of a greenish-white colour, adherent at their apices, and soon fall off, like a little cap, from the anthers, when they spread and shed their pollen. The fruit is a succulent, globular berry, one-celled when ripe; naturally containing five seeds; but in general only two, which are hard and of an irregular form. There are many varieties of the vine; that which is called the Alexandrian Frontignac yields the most delicious grapes for eating, and the Syrian the largest bunches.[2]

Raisins are made from the varieties named the *black-raisin grape*, and the *white-raisin grape*. They are cured in two methods; either by cutting the stalk of the bunches half through, when the grapes are nearly ripe, and leaving them suspended on the vine till their watery part be evaporated, and the sun dries and candies them; or by gathering the grapes when they are fully ripe, and dipping them in a ley made of the ashes of the burnt tendrils; after which they are exposed to the sun to dry. Those cured in the first method are most esteemed. Some are stated to be dried by the heat of an oven. They are brought to this country packed in boxes with sand; and in jars.

The jar raisins are the best; and of these the Muscatels are the most esteemed. There is a small species of raisin, commonly called currants, which is a corruption of the word *Corinth*, where they

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[1] There were many vineyards in different parts of this country from which wine was made. In a Christmas piece performed at Oxford in 1607, in reference to the wild boar, he is termed "the foe to the vineyard;" a proof that vineyards then existed and were prized. William of Malmsbury informs us that the grapes in the Vale of Gloucester furnished the best wine; the next those of the Isle of Ely. During the Reformation most of the ecclesiastical vineyards were destroyed. We are also informed that in the cellar at Arundel Castle, in 1763, there were sixty pipes of excellent Burgundy, the produce of a vineyard attached to the castle. — *Museum Rusticum*, i. 85.

[2] This is supposed to be the sort of grape which the spies, sent by Moses to examine Canaan, cut down at the brook Eshcol; "a branch with one cluster of grapes, and they bare it between two upon a staff." — *Numbers*, chap. xiii. 23. Strabo relates, that in Margiana bunches of grapes were produced two cubits, or a yard long; and in some of the Archipelago islands they weigh from thirty to forty pounds. The Syrian grape in this country has produced bunches weighing nineteen pounds and a half. — *Martyn's edition of Miller's Dictionary*. There is a grape cultivated in Madeira as a dessert fruit, the clusters of which sometimes weigh twenty pounds.

were originally grown: but they are now cultivated in great abundance in Zante. They are imported in barrels, in which they are trodden.

Qualities. — *Grapes*, when recent and fully ripe, have an agreeable, cooling, sweet, subacid taste. They contain, besides *water*, *sugar*, *mucilage*, and *jelly*, *albumen*, *gluten*[1], *tannic acid*, *bitartrate of potassa*, *tartrate of lime*, *phosphate of magnesia*, *chloride of sodium*, *sulphate of potassa*, and *tartaric*, *citric*, and *malic acids:* and a *mucoso-saccharine principle*, which Chaptal and Proust regard as the constituent on which the fermentative process in bruised grapes depends. *Raisins* differ from grapes chiefly in the quantity of saccharine matter being more abundant; but the sugar of grapes differs slightly from common sugar in composition.

Medical properties and uses. — The ripe fruit of the vine is cooling and antiseptic; and, when eaten in large quantities, diuretic and laxative. Grapes are very useful in febrile diseases, particularly in bilious and putrid fevers, dysentery, and all inflammatory affections. In Syria, the juice of ripe grapes, inspissated, is used in great quantity in these diseases.[2] Grapes have been strongly recommended as an article of common diet in phthisis[3]; and they certainly contain much bland nutritious matter, well fitted for phthisical habits. *Raisins* are more laxative than the fresh fruit, and are apt to prove flatulent when eaten in any considerable quantity. They are used as an adjunct to some officinal preparations; but add nothing to their efficacy.

ULMUS. *Spec. Plant. Willd.* i. 1324.

Cl. 5. *Ord.* 2. Pentandria Digynia. *Nat. ord.* Ulmaceæ.

G. 505. *Calyx* five-cleft. *Corolla* none. *Capsule* (*samara*) compressed, membranaceous.

Species 1. U. *campestris*.[4] Common Elm. *Med. Bot. 3d edit.* 710. *t.* 242. *Smith, Flor. Brit.* i. 281.

Officinal. ULMUS, *Lond.* Elm Bark.

Syn. Orme (*F.*), Ulmrinde (*G.*), Olm (*Dutch*), Alm (*Dan.*), Kara Wiazowa (*Pol.*), Olmo (*I.*, *S.*, *Port.*), Ilim (*Russ.*).

The elm tree is indigenous, and very abundantly cultivated, flowering in March or early in April, before the leaves are unfolded. It grows to a considerable height, sending off strong, spreading, lateral branches; with the bark of the trunk very rough and cracked, but that of the younger branches smooth and tough. The

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[1] The gluten excites the vinous fermentation in the juice of the grape when expressed. Fabroni has shown, that it is lodged on the membranes that separate the cells of the grape; and becomes mixed with the saccharine part when the juice is expressed.

[2] *Russell's Natural History of Aleppo*, i. 83.

[3] *Moore's View of Society, &c., in Italy*, ii. letter 62.

[4] Πτελεα Græcorum.

leaves are rough on both sides, villose beneath along the veins, doubly serrate, longer on one side of the midrib than on the other, about three inches long, two broad, and of a dark-green colour. The flowers, which appear before the leaves, are in distinct gems, clustered, scarcely peduncled, numerous, small, of a brownish flesh-colour, and have a violet odour: the capsules are oval, oblong, bordered, and contain a single, roundish seed.[1]

The inner part of the bark of the younger branches, which is of a yellowish colour, is the part officinally used, and is sold free from the epidermis.

Qualities. — Elm bark is inodorous, and has a slightly bitter, mucilaginous taste. When boiled in a small quantity of water, it forms a thick, dark-brown decoction, which gelatinises as it cools; and when evaporated leaves a brittle, semi-transparent substance, soluble in water, but insoluble in alcohol and ether, to which, however, it imparts a brownish colour. The brittle residue, when treated in the same manner as Klaproth treated the gum-like exudation from the Ulmus *nigra*, afforded nearly the same results[2]; and consequently it must be regarded as *ulmin:* but from the effects of some re-agents, I am inclined to consider it a peculiar modification of *mucus*, combined with *extractive*, some *tannic acid*[3]; and *bitartrate* of *potassa*, which Scheele detected in elm bark.

Medical properties and uses. — This bark operates as a diuretic. It has been given with seeming benefit in herpetic eruptions; and Dr. Lettsom[4] attributes the cure of a severe case of "lepra ichthyosis," in which other remedies had failed, to the use of this bark. I have long prescribed it instead of sarsaparilla. Other practitioners have also related cases of its efficacy; but Dr. Willan[5] thinks it is of little use. It is generally given in the form of decoction.

Officinal preparation.—*Decoctum Ulmi*, L.

URGINEA SCILLA. See *Scilla.*

UVA. See *Vitis.*

UVÆ URSI FOLIA. See *Arctostaphylos.*

WINTERA. See *Drymis.*

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[1] The age of the elm is yet unknown. Several socks of it which were planted in France, by the orders of Sully, in 1580, were alive in 1824. They were from 80 to 90 feet high, and from 25 to 30 in circumference.

[2] *Thomson's Chemistry*, 4th edit. iv. p. 695.

[3] Very little tannic acid is present, as it scarcely affects a solution of gelatine.

[4] *Medical Memoirs*, p. 152.

[5] *Description, &c. of Cutaneous Diseases*, i. p. 139.

ZINCUM. *Lond. Edin. Dub.* Zinc.

Syn. Zinc (*F.*), Zink (*G., Dutch, Swed., Dan.*), Zinco (*I.*), Zinc (*S.*), Zinco (*Port.*) Spiagter (*Russ.*), Tootoonāgum (*Tam.*), Sungbusrie (*Duk.*).

Zinc is a semi-ductile metal procured in great abundance in Britain, particularly in Derbyshire; and in most of the mining countries of Europe. It occurs in

A. The metallic state.

i. combined with sulphur. — Sp. 1. *Blende.*
Var. *a.* Yellow blende.
b. Brown blende.
c. Black blende.

B. Oxidized.

ii. combined with oxygen. — 1. *Red Zinc ore.*
iii. combined with silica. — 2. *Electric calamine.*
iv. acidified by carbonic acid. — 3. *Common calamine.*
Var. *a.* crystallized.
b. compact.
c. earthy.

As the fourth species of these ores is an article of the Materia Medica, we shall describe its characters and properties before we notice those of metallic zinc.

1. COMMON CALAMINE.

Officinal. CALAMINA PRÆPARATA, *Lond. Edin.* Calamine. Native Carbonate of Zinc, burnt and rubbed to a very fine powder and washed, *L.* Levigated impure Carbonate of Zinc, *E.*

Syn. Pierre Calaminre (*F.*), Zinkopath, Galmey (*G.*), Kalmei (*Belg.*), Gallmeja (*Swed.*), Galmei (*Dan., Russ.*), Calamijn-steen (*Dutch*), Pietra Calaminario Giallimina (*I.*), Calamina, Piedra Calaminar (*S.*), Piedra Calaminar (*Port.*), Madal tootum (*Tam.*).

This ore of zinc is found abundantly in Derbyshire, Somersetshire, Cumberland, and Flintshire, occurring in veins in secondary limestone, generally accompanied by galena, calcareous spar, quartz, and other ores of zinc. In the Harz[1] the three varieties are indiscriminately used; and consist, according to an analysis by Mr. Smithson[2] of the following components: *var. a.* 65·2 oxide of zinc, 34·8 carbonic acid; *var. b.* 64·8 oxide of zinc, 35·2 carbonic acid; *var. c.* 71·4 oxide of zinc, 13·5 carbonic acid, 15·1 water, — in 100 parts of each variety. They are, however, generally calcined in a moderate heat, by which part of their carbonic acid is dissipated, before they are brought to the shops.

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[1] The annual produce is 115 tons.

[2] *Phil. Trans.* 1803., 17.

Qualities.—Calamine is usually in the form of greyish-yellow, or reddish-yellow, friable lumps, without lustre, opaque, and breaking with an irregular, earthy fracture. The specific gravity of the first two varieties is 4·334; that of the last 3·584. Before the blowpipe, calamine becomes yellow; and when exposed to its utmost heat, is sublimed. It dissolves in dilute acid with effervescence. It is not used as a remedy till after it is prepared; and then only as an external application.

According to the London College, it is almost entirely soluble in diluted sulphuric acid, emitting but few bubbles of carbonic acid gas. Ammonia and the fixed alkalies throw down precipitates from its solution in acids, which are redissolved by excess of the precipitants. Calamine should consist chiefly of oxide of zinc with a little carbonate, but it is very liable to adulteration, and often contains a very large amount of sulphate of baryta, which can be readily detected by its insolubility in boiling nitric acid.

Officinal preparations.—*Ceratum Calaminæ*, L. E.

2. METALLIC ZINC.

Officinal. ZINCUM, *Lond. Edin. Dub.* Zinc.

Although the method of extracting zinc from its ores had been long known and practised in India and China, yet it was not known in Europe till about 1721, when Henke pointed out a method of effecting it. Von Swab first obtained it by distillation in 1742. The Greeks certainly were not acquainted with zinc although they employed cadmia, which contained zinc, in the manufacture of brass. At present the mode of procuring metallic zinc is well understood, and conducted in the following manner:—The sulphuret or blende, which is the ore usually employed, is first broken to pieces, and the galena and pyrites separated by hand: it is then roasted in a reverberatory furnace, by which the carbonic acid and part of the sulphur are driven off. The roasted ore being washed, to separate the metallic particles from the lighter parts, is now ground in a mill with one-eighth of its weight of charcoal; and put into large earthern jars placed in a circular furnace, and through the bottom of each of which passes an iron tube, which goes through the floor of the furnace into a vessel of water placed beneath. The cover of each jar is firmly and accurately luted on, so that the reduced zinc, as it is elevated by the strong heat of the furnace, not finding a vent to escape by the top, descends through the iron tube into the water, and is there condensed in small metallic drops, which are afterwards melted and cast into ingots, in which state it is brought to market[1], under the name of *Speltre.*

[1] The principal works are near Bristol, and at Swansea.

Qualities. — Zinc, when rubbed between the fingers, emits a very perceptible odour, and has a peculiar taste. Its colour is brilliant, white with a shade of blue, and its fracture shining and lamellated; hard, yet staining the fingers black when rubbed upon them. Its specific gravity varies from 6·861 to 7·2. In any temperature between 212° to 300°, it is very malleable and ductile; but at a higher temperature it can be pulverised in a mortar. It may be drawn into wire, but its ductility is not great. Exposed to a white heat, in close vessels, it distils over unchanged. Its equivalent is 32·52. Zinc melts at 773°[1] Fahr.; if in contact with air, it is rapidly oxidized; and, at the temperature of ignition, 941° Fahr., it burns with a white dazzling flame, and is volatilized in the state of a flocculent, white oxide. It is oxidized and its oxide is soluble in all the acids: the oxide is precipitated by fixed alkalies and ammonia, but redissolved by excess: not precipitated by sulphuretted hydrogen in an acid solution, but thrown down white in a neutral or alkaline solution, or by alkaline sulphurets. It decomposes water when aided by a small portion of sulphuric or of hydrochloric acid: — the hydrogen set free holds in solution a small quantity of metallic zinc. It is used only for pharmaceutical purposes. The zinc of commerce is never pure, a fact which it is of importance to remember in using Marsh's apparatus for detecting the presence of arsenical salts in cases of poisoning. It usually contains iron, carbon, and not unfrequently arsenic and sulphur.

ZINCI SULPHAS. Lond. See Part III.

ZINGIBER. *Trans. Linn. Soc.* viii. 347.

Cl. 1. *Ord.* 1. Monandria Monogynia. *Nat. ord.* Scitamineæ.

G. novum. Anther double. *Filament* lengthened beyond the anther with a furrowed awl-shaped beak embracing the style. *Style* received in the furrow of the anther.

Sp. 1. Z. *officinale.*[2] Officinal Ginger. *Jacquin, Hortus Vindobonensis,* i. 31. *t.* 75. (Amomum *Zingiber*) *Willd. Spec. Plant.* i. 6. *Med. Bot. 3d edit.* 731. *t.* 250. *Rumph. Amb.* ii. *t.* 12. *Roscoe, Linn. Trans.* viii. 348.

Officinal. ZINGIBER, *Lond. Edin. Dub.* Ginger. The rhizome of Zingiber officinale.

Syn. Gingembre (*F.*), Ingwer, Imber (*G.*), Zenzero (*I.*), Gengibre (*S.*), Gengivre (*Port.*), Gember (*Dutch*), Ingefer (*Dan.*), Ingefära (*Swed.*), Imber beloi (*Russ.*), Jembier (*Pol.*), Sont'h, Ada, Adrac (*H.*), Sunt'hi (*Sans.*), Dshey (*Javanese*), Sookkoo (*Tam.*), Alia (*Malay*), Zungebell (*Pers.*), Siwe (*Amb.*), Inschi kau (*Malabar*), Sepuddnay (*Malay*).

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[1] Daniell.

[2] Ζιγγιϐερις Dioscoridis. The similarity between the Greek name of the plant and the Sanscrit *sringavera* (horn-shaped) is remarkable — *Asiatic Researches*, vol. xi. p. 346.

The ginger plant is a native of the East Indies[1], and is particularly abundant in the mountainous district of *Gingi*, to the east of Pondicherry, whence it derived its name. It is now naturalized to the West Indies, where it flowers in September. The rhizome is biennial, tuberous and fleshy; the stem is an annual culm, about three feet in height, oblique, and enclosed in the imbricate sheaths of the leaves. The leaves are alternate, linear-lanceolate, six inches to twelve long, equilateral, smooth, and on embracing sheaths. The flowers, which have an aromatic odour, are produced on a solitary, radical scape, enveloped in obtuse, striated sheaths, with a yellow membranous margin, half closing the flowers: the corolla with outer limb three-parted, the inner one lipped: the anther-bearing filament is extended beyond the anther into a simple incurved beak, with a groove to receive the style after it has passed between the lobes of the anthers: the style is filiform, with a funnel-shaped stigma, ciliate. The capsule is smooth, fleshy, roundish, unilocular, containing many oblong seeds, most of which are abortive.

In Jamaica the herbaceous part of the plant withers in December; after which the rhizomes are dug up in January; but when they are intended to be preserved in syrup, they are dug up when the shoots do not exceed five or six inches in height. For preparing the dried ginger, the best pieces are selected, scraped, then scalded, and dried in the sun with great care. This is called *white ginger;* in contradistinction to which the rhizomes which are not scraped, but only scalded in boiling water before being dried, are denominated *black ginger.* It is said that ginger, after it is imported, is bleached by exposure to the fumes of sulphur, or by washing in a solution of chloride of lime. The confected or preserved ginger is prepared by scalding the green rhizomes till they are tender; then peeling them in cold water, and putting them into a thin syrup, from which in a few days they are shifted into the jars in which they come home, and a very rich syrup poured over them, which is sometimes three or four times renewed.[2]

Dried ginger is imported in bags, each containing about one hundred weight. The white kind, usually called *Jamaica ginger*, brings the highest price, being more pungent and better-flavoured than the black, or than the *East Indian*, which is unscraped, and larger than the Jamaica; *Barbadoes* ginger is in short, flat pieces, covered with a corrugated, dark-coloured epidermis. A species of ginger is brought from *Africa:* it is in small pieces, partially scraped, and pale coloured.[3] The external characters of goodness

[1] It is named *alè* by the Brahmins.

[2] In Jamaica, the shifted syrup is diluted with water, and fermented into a pleasant liquor, called cool-drink, with some mixture of lignum-vitæ and sugar. — *Long's Jamaica.*

[3] Pereira's *Elements.*

in all are soundness, heaviness, and firmness: the pieces that are light and soft, worm-eaten, or very friable and fibrous, should be rejected. The confected ginger is nearly translucent when good.

Qualities — Dried ginger has a pungent aromatic odour, and a hot biting taste. Its odour appears to depend on a volatile oil, which can be obtained separate in distillation with water, and has all the flavour of ginger, is of a pale yellow colour, and tastes at first mild, but soon afterwards impresses its heat and acrimony on the palate. Water, alcohol, and ether extract the virtues of ginger. The greater part of the rhizome is starch, which can be separated by triturating the ginger with water, and straining through cloths: then, after the fecula, which is suspended in the water, has subsided, separating it by decanting off the water, and macerating in alcohol; what remains undissolved is a tolerably pure insipid starch. The pungency of ginger resides chiefly in a resinous matter which is combined with the fecula, but may be obtained separate by evaporating the ethereal tincture on the surface of water. M. Morin of Rouen has analyzed ginger, and gives the following as its components: — *Resin soluble in ether, resinous matter insoluble in ether,* a *bluish-green volatile oil, vegeto-animal matter,* a substance analogous to osmazome, *acetic acid, acetate of potassa, starch, gum, sulphur,* several *oxides,* and lignin.[1]

Medical properties and uses. — Ginger is stimulant, carminative, and sialogogue. It acts both topically on the part to which it is applied, and also generally; and exalts the cerebral functions. It has been found useful in flatulent cholic, dyspepsia, and tympanitis; and in gout when it attacks the stomach. It is less frequently used alone than as an adjunct to other remedies, to promote their efficacy and give them warmth; as, for example, as an adjunct of griping purgatives, to lessen their griping property. The local stimulus of ginger, when chewed, excites the salivary glands, and provokes a considerable flow of saliva: hence it has been found useful as a sialogogue in relaxations of the uvula and tonsils, and in paralysis of the muscles of the tongue and fauces. Its powder may be used as a counter-irritant, in the same manner as mustard.

As a condiment, ginger is employed with too little discretion. In a weakened condition of the stomach, a small quantity tends to promote digestion, and relieve flatulence: but it proves injurious when there is any tendency to spasmodic stricture of the urethra, and it is apt to induce it.

The dose of powdered ginger may be from grs. x. to ℈j.

Officinal preparations. — *Syrupus Zingiberis,* L. E. D. *Tinctura Zingiberis,* L. E. D. It is likewise an ingredient in many officinal preparations, as confections, infusions, pills, and powders.

[1] *Journ. de Pharm.* Juin, 1823.

PART III.

PREPARATIONS AND COMPOUNDS.

It must be borne in mind, that the weights ordered by the Dublin College are avoirdupois (modified), and not the Apothecaries' of the London and Edinburgh Colleges. The same measures are employed by the three British Colleges. *See* Part I.

ACIDS.

ACETUM DESTILLATUM, Lond. Edin. *Distilled Vinegar.*

"Take of vinegar a gallon; distil seven pints in a sand-bath."

"Its specific gravity is 1·0065. A fluid ounce is saturated by fifty-seven grains of the crystals of carbonate of soda."

Edinburgh.

"Take of vinegar (French, by preference,) *eight parts:* distil over with a gentle heat *seven parts:* dilute the product, if necessary, with distilled water till the density is 1005."

Syn. Vinaigre distillé (*F.*), Distillirter Essig (*G.*), Azynagtige zuur (*Dutch*), Aceto distillato (*I.*), Vinagre distilado (*S.*), Vinagre distillada (*Port.*).

In this preparation the acetic acid is in a purer but more diluted state than that in which it exists in vinegar; being freed from the mucilage, extractive, bitartrate of potassa, sulphuric acid, colouring matter, and most of the other extraneous matters which vinegar contains.

In performing the above processes on a large scale, the head of the still and the worm should be porcelain or glass. It is important to avoid carrying the distillation too far; hence the London and the Edinburgh Colleges now order seven-eighths to be distilled. By continuing the process a little too long, the whole product acquires an unpleasant empyreumatic flavour. This is avoided by changing the receiver rather before the seven-eighths

have been obtained; and, if to the residue be added an equal quantity of hot water and half an ounce of recently-burnt animal charcoal, for every pint of fluid in the retort, the distillation may be recommenced, and an additional portion of the diluted acid will be obtained, equally pure and strong as the former. At the end of the operation, when dilution has not been employed, the residue is a dark brownish-red coloured liquor, strongly acid, very empyreumatic, and which deposits bitartrate of potassa. Mr. Brande regards as an improvement in the distillation of vinegar, the employment of the heat of high-pressure steam, instead of that of an open fire; as both the risk of empyreuma is prevented, and "a larger portion may usually be distilled off before any foreign flavour is perceptible."[1] If French vinegar be used, a stronger acid is procured than British vinegar yields.

Qualities. — Distilled vinegar has a fainter and less agreeable odour than common vinegar; a grateful, not strong, acid taste; is limpid and nearly colourless; and of a specific gravity varying from 1005 to 10065. It contains, besides the acetic acid, a small quantity of alcohol, and some acetic ether. It should evaporate completely when heated; and afford no precipitate with acetate of lead, nor nitrate of silver, nor iodide of lead. Neither hydrochloric acid nor ammonia should change its colour. After a plate of silver has been digested in it, hydro-sulphuric acid should afford no precipitate. One hundred grains require thirteen grains of crystallized carbonate of soda for their saturation, or a fluid ounce requires 57 grains, indicating 4·6 per cent. of real acetic acid: but according to the Edinburgh College, one hundred minims neutralize eight grains of crystallized carbonate of soda; hence the Edinburgh preparation is weaker than that of London: the percentage of real acid being 3·07. It dissolves the gum resins and the active principles of many plants, such as those of the squill and colchicum; and it forms acetates with the alkalies and several of the metallic oxides.

Distilled vinegar is sometimes adulterated. Sulphuric acid is detected by a precipitate being produced on the addition of a solution of acetate of baryta: acetate of lead, by the solution of iodide of potassium, affording a yellow precipitate, or by a solution of sulphuretted hydrogen, forming a dark-coloured precipitate. Acetate of copper is detected by the acid assuming a blue colour, when supersaturated with ammonia, or affording a brown precipitate with ferrocyanide of potassium.

Medical properties and uses. — The same as those of common vinegar (see *Acetum*, Part II.); but, as it is purer, and not liable to spontaneous decomposition, it is fitter for pharmaceutical purposes.

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[1] *Manual of Pharmacy,* p. 92.

Officinal preparations. — *Acetum Opii*, E. *Acetum Colchici*, E. *Acetum Scillæ*, E. *Oxymel*, L.

ACIDUM ACETICUM GLACIALE, Dub. *Glacial Acetic Acid.*

"Take of acetate of lead, any convenient quantity. Place it in an oven at about the temperature of 300°, until it ceases to lose weight, and having then brought it by trituration to a fine powder, let it be introduced into a flask or retort, and exposed to an atmosphere of dry muriatic acid gas, until very nearly the whole of it exhibits a damped appearance. The flask or retort being now connected, in the usual manner, with a Liebig's condenser, let heat be applied by means of a chloride of zinc bath, until the entire of the acetic acid shall have distilled over. The muriatic acid gas should be disengaged from the materials directed in the formula for *Acidum Muriaticum*, using eight ounces of salt for every pound of anhydrous acetate of lead; and, to render it quite dry, it should, before being conducted into the vessel containing the sugar of lead, be made to bubble through oil of vitriol, and then pass through a long tube parted with small fragments of fused chlorides of calcium. The specific gravity of this acid is 1065."

ACIDUM ACETICUM FORTE, Dub. *Strong Acetic Acid.*

"Take of glacial acetic acid, six fluid ounces; distilled water, four ounces: Mix. The specific gravity of this acid is 1066."

ACIDUM ACETICUM, Edin. *Acetic Acid.*

"Take of acetate of lead any convenient quantity: heat it gradually in a porcelain basin, by means of a bath of oil or fusible metal (8 tin, 4 lead, 3 bismuth), to 320° Fahr., and stir till the fused mass concretes again; pulverise this when cold, and heat the powder again to 320° with frequent stirring, till the particles cease to accrete. Add six ounces of the powder to nine fluid drachms and a half of pure sulphuric acid contained in a glass matrass: attach a proper tube and refrigeratory; and distil from a fusible metal bath, with a heat of 320°, to complete dryness. Agitate the distilled liquid with a few grains of red oxide of lead, to remove a little sulphurous acid, allow the vessel to rest a few minutes, pour off the clear liquor, and re-distil it. The density is commonly from 1063 to 1065, but must not exceed 1068·5."

Syn. Acide Acetique (*F.*), Essigsäure (*G.*), Azynzuur (*Dutch*), Acido acetico (*I.*).

In both these processes, when carefully conducted, the product is the same, namely, an acid containing only a single equivalent of water. In the Dublin process, the dry hydrochloric acid gas,

acting upon acetate of lead, deprived of its water of crystallization, causes a double decomposition, and the products are chloride of lead, and monohydrated acetic acid. In the Edinburgh process, the products are, sulphate of lead and acetic acid, and any trace of sulphurous acid formed during the process is removed by the agitation with the red oxide of lead. In the present London Pharmacopœia, acetic acid is placed in the list of the Materia Medica, no process being given for its preparation, but it is supposed to be such as is made from the destructive distillation of wood, and afterwards purified. The same acid, called also Pyroligneous acid, is contained in the lists of the Dublin and Edinburgh Colleges.

Qualities. — Glacial acetic acid has a grateful, fragrant, pungent odour, a very sour and acrid taste; and when applied to the skin, it inflames it and raises a blister. It is limpid, colourless, and highly volatile; its odour is pungent and refreshing, its taste acrid; and it takes fire when heated in the open air; and burns with a white light. At 40° Fahr. it becomes a crystalline solid. The density of the Edinburgh preparation is commonly from 1063 to 1065, and should not exceed 1068·5. The density of the Dublin preparation is 1065. It should be free from colour, and unaltered by sulphuretted hydrogen, or nitrate of baryta. Acetic acid is capable of oxidizing iron, zinc, copper, nickel, and tin; it combines with alkalies, earths, and metallic oxides, forming acetates; dissolves resins, gum resins, camphor [1], and volatile oils; and combines with alcohol, which, when aided by heat, it converts into a species of ether. With water it unites in any proportion, and during the mixture, heat is evolved. Pure acetic acid consists of 4 eq. of carbon + 4 eq. of hydrogen + 4 eq. of oxygen, or 1 eq. of anhydrous acid as it exists in the dry acetates + 1 eq. of water. Formula $C_4 H_3 O_3 + HO$.

The strength of acetic acid cannot be determined by its specific gravity, although up to sp. gr. 1062, the density may be taken as a pretty accurate guide; above this, however, acids of different strengths may have the same density.

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[1] *Henry's Aromatic Vinegar* is a solution of camphor, and some volatile oil, in acetic acid.

The following Table drawn up by M. Mohr, exhibits the sp. gr. of Acetic acid of almost every strength : —

Per Cent. of Glacial acid, $C_4\ H_3\ O_3$ + H O.	*Sp. Gr.*	*Per Cent. of Glacial acid,* $C_4\ H_3\ O_3$ + H O.	*Sp. Gr.*	*Per Cent. of Glacial acid,* $C_4\ H_3\ O_3$ + H O.	*Sp. Gr.*
100	1·0635	66	1·069	32	1·0424
99	1·0635	65	1·068	31	1·041
98	1·067	64	1·068	30	1·040
97	1·0680	63	1·068	29	1·039
96	1·069	62	1·067	28	1·038
95	1·070	61	1·067	27	1·036
94	1·0706	60	1·067	26	1·035
93	1·0708	59	1·066	25	1·034
92	1·0716	58	1·066	24	1·033
91	1·0721	57	1·065	23	1·032
90	1·0730	56	1·064	22	1·031
89	1·0730	55	1·064	21	1·029
88	1·0730	54	1·063	20	1·027
87	1·0730	53	1·063	19	1·026
86	1·0730	52	1·062	18	1·025
85	1·0730	51	1·061	17	1·024
84	1·0730	50	1·060	16	1·023
83	1·0730	49	1·059	15	1·022
82	1·0730	48	1·058	14	1·020
81	1·0732	47	1·056	13	1·018
80	1·0735	46	1·055	12	1·017
79	1·0732	45	1·055	11	1·016
78	1·0732	44	1·054	10	1·015
77	1·073	43	1·053	9	1·013
76	1·072	42	1·052	8	1·012
75	1·072	41	1·0515	7	1·010
74	1·072	40	1·0513	6	1·008
73	1·071	39	1·050	5	1·0067
72	1·071	38	1·049	4	1·0065
71	1·071	37	1·048	3	1·004
70	1·070	36	1·047	2	1·002
69	1·070	35	1·046	1	1·001
68	1·070	34	1·045	0	1·0000
67	1·069	33	1·044		

The *Acidum Aceticum Forte* of the Dublin College is simply a more dilute acid than the glaciale. Its specific gravity is 1066, and contains 59 per cent. of glacial or monohydrated acid, as will be seen in the Table. It is used by the Dublin College to form their *Acetum Cantharidis* and *Acidum Aceticum Camphoratum.* The glacial acid is only used for making the strong acid. The

Edinburgh College directs that their acetic acid should be used in making *Acidum Aceticum Camphoratum*, also in *Acetum Cantharidis*, but diluted, in this preparation, with *Pyroligneous acid.*

The strength of the acetic acid derived from wood or pyroligneous acid differs in the three Pharmacopœias. According to the London College the specific gravity is 1048, and contains, according to the above Table, 37 per cent. of monohydrated acid: according to the Edinburgh College the specific gravity is at least 1034, containing therefore 25 per cent. of acid: that of the Dublin College is 1044, containing 33 per cent. of glacial acid.

The physical and chemical properties of the pyroligneous acid are similar to those given above, except that the acid is much weaker. The London and Edinburgh Colleges have given tests for ascertaining the purity and strength of the acids. By the former it is said to be "free from colour, of a sharp odour, sp. gr. 1048, dissipated in vapour by heat, and not precipitated by the addition of nitrate of silver, or chloride of barium. A strip of silver digested in it, and afterwards hydrochloric acid dropped in, nothing precipitates. Neither hydrosulphuric acid nor ammonia, nor ferrocyanide of potassium after ammonia, alters its colour. One hundred grains are saturated by eighty-seven grains of the crystals of carbonate of soda." The Edinburgh tests are contained in the above.

Incompatibles. — Alkalies and their carbonates, alkaline earths and their carbonates.

Medical properties and uses. — Acetic acid is stimulant and rubefacient: and when taken internally, undiluted, it acts as a violent irritant poison. It dissolves the animal tissue, and destroys life by its chemical influence. Its poisonous property is so great, that a case of a fatal effect being caused by its topical application is on record.[1] Its vapour, when long inhaled, is said to bring on chronic inflammation of the lungs: but this is doubtful. It is principally employed as a refreshing scent, in syncope, asphyxia, and nervous headachs; and for obviating the unpleasant smell of the confined air of crowded assemblies and of the sick room. It may be used as a counter-irritant, when applied to the skin, in cynanche tonsillaris, croup, and other internal inflammations. It is, also, an excellent application to warts and corns, which it seldom fails to remove; but, in applying it, care must be taken to avoid eroding the surrounding skin. If a piece of bibulous paper be dipped in it, and applied to the skin, it is a useful and powerful substitute for a blister, when the effect of such an application is required to be rapidly obtained.

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[1] Orfila, in *Journ. Chim. Med.* ii.

ACIDUM ACETICUM DILUTUM, Lond. Dub. *Dilute Acetic Acid.*

"Take of acetic acid *twenty-three fluid drachms,* distilled water *a pint.* To the acid add as much water as may be necessary, so that it may accurately fill the measure of a pint, and mix."

"Its specific gravity is 1008. A fluid ounce is saturated by 57 grains of the crystals of carbonate of soda."

Dublin.

"Take of acetic acid of commerce (sp. gr. 1044) *one pint,* distilled water *seven pints.* Mix. The specific gravity of this acid is 1006."

Very dilute acetic acids, containing from 4 to 6 per cent. of glacial acid. Properties and uses, the same as distilled vinegar. See Acetum Part II., and Acetum distillatum.

ACID ARSENIOSUM PURUM. See *Preparations of Arsenic.*

ACIDUM BENZOICUM, Edin. Dub. *Benzoic Acid.*

"Take of benzoin any convenient quantity, put it into a glass matrass, and by means of a gradually increasing heat, sublime as long as anything rises, squeeze the sublimate between folds of filtering paper to remove the oil as much as possible, and sublime the residuum again."

Dublin.

"Take of benzoin any convenient quantity. Place it in a small cylindric pot of sheet iron, furnished with a flange at its mouth; and having fitted the pot into a circular hole in a sheet of pasteboard, interpose between the pasteboard and flange a collar of tow, so as to produce a nearly air-tight junction. Let a cylinder of stiff paper, open at one end, eighteen inches high, and having a diameter at least twice that of the pot, be now placed in an inverted position on the pasteboard, and secured to it by slips of paper and flour paste; a couple of inches of the lower part of the pot being passed through a hole in a plate of sheet tin, which is to be kept from contact with the pasteboard by the interposition of a few corks; let a heat just sufficient to melt the benzoin (that of a gas-lamp answers well) be applied, and continued for at least six hours. Let the product thus obtained, if not quite white, be enveloped in bibulous paper, then subjected to powerful pressure, and again sublime."

Syn. Acide Benzoique (*F.*), Benzoesäure (*G.*), Benzoin zuur (*Dutch*), Acido Benzoico (*I.*).

These processes are as nearly the same as that recommended by Chaptal: but if the fire be not very nicely regulated, the portion of empyreumatic oil volatilized, which gives the acid the peculiar odour of the benzoin, and a yellowish tinge is so great, that it cannot be entirely separated from these impurities, even by the second sublimation after pressure between bibulous paper.[1] In a large way, it is sublimed from an iron pot into a wooden box, lined with paper, and connected with the subliming vessel by means of a conical tin plate neck. The sublimation is repeated with a brisk heat; and again after the acid has been pressed in bibulous paper.

Dr. Mohr directs the benzoin, in coarse powder, mixed with an equal weight of sand, to be spread on the bottom of a round of iron, and only two inches deep. A sheet of dried bibulous paper is pasted over the opening of this vessel, and over this is placed a hat made of thick paper, which is tied tight to the sides of the vessel. The whole is then submitted to heat for three or four hours; in which time the acid passes through the bibulous paper, and is deposited on the inside of the paper hat. The oil is thus absorbed by the bibulous paper, and the crystals are procured pure.

Benzoic acid may also be extracted from the other balsams: it has been detected by Vogel in the flowers of Trifolium *melilotus officinalis;* and is also found in the urine of the cow and that of other ruminantia when in a putrid condition.

Qualities. — Benzoic acid, when perfectly pure, is inodorous; but as it is usually found in the shops, it has a slight aromatic odour: its taste is pungent, sweetish, acrid, and acidulous. The pure sublimed acid is in feathery or flocculent crystals, soft to the touch, and not pulverulent, of a beautiful whiteness, and a silky lustre. Its specific gravity is 0·657. When heated, it melts, emits a suffocating acrid vapour; and in a strong heat burns with a white flame. Benzoic acid is soluble in twenty-four times its weight of boiling water; but the water lets fall nineteen-twentieths in cooling. Cold alcohol takes about one half its weight; boiling alcohol its own weight of this acid; the addition of water precipitates the acid. It is also soluble in hot acetic acid; and also without change in concentrated sulphuric and nitric acids. With the alkalies, earths, and metallic oxides, it forms benzoates, some of which are used in medicine. Benzoic acid, when pure, is sublimed entirely by heat. The crystallized acid contains in each equivalent 14 eq. of carbon + 6 eq. of hydrogen + 4 eq. of oxygen. It is

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[1] This acid was originally obtained by sublimation. It was described under the name of *flowers of Benzoin* by Blaise de Vigeneve, in 1608. — *Thompson's Chymistry,* 4th edit. 289.

generally regarded as an hydrated oxide of benzule ($C_{14} H_5 O_2$), and its formula is $C_{14} H_5 O_3 + HO$. In the benzoates, the equivalent of water is replaced by some other base.

Medical properties and uses. — This acid is stimulant; but, although it is retained by all the Pharmacopœias, it is seldom prescribed. It possesses, however, a powerful influence on the mucous membrane, and it has lately been prescribed with advantage in some cases of gonorrhœa. When taken into the stomach it is absorbed, and then passes through the kidneys as hippuric acid; it does not, however, as at first supposed, diminish the quantity of uric acid in that fluid.

It is contained in the *Tinctura Camphoræ composita*, L. *Tinctura Opii Camphorata*, E. D.

ACIDUM CITRICUM, Edin. *Citric Acid.*

"Take of lemon-juice, *four pints;* prepared chalk, *four ounces and a half* or a *sufficiency ;* diluted sulphuric acid, *thirty-six fluid ounces*, or in the same proportion to the chalk required. Boil the lemon-juice, allow it to rest, pour off the clear liquor, boil this again, and add the chalk to it while hot, by degrees, till there is no more effervescence and the liquor ceases to taste acid. Collect the precipitate, and wash it with hot water till the water passes from it colourless. Squeeze the residuum in a powerful press; mix it uniformly with two pints of distilled water; and then add the sulphuric acid by degrees and with constant stirring. Try whether a small portion of the liquid, when filtered, gives, with solution of nitrate of baryta, a precipitate almost entirely soluble in nitric acid; and if the precipitate is not nearly all soluble, add a little citrate of lime to the whole liquor till it stand this test. Separate now the clear liquor by subsidence or filtration, washing the insoluble matter with cold water, and adding the washing to the liquor; concentrate with a gentle heat till crystals form on the surface: set the liquor aside to cool and crystallize; and purify the crystals by repeated solution and crystallization till they are colourless."

Syn. Acide Citrique (*F.*), Acido Citrico (*I.*), Citronensaure (*G.*), Citroenzuur (*Dutch*).

This process, which is a modification of one contrived by Scheele, should never be performed by the apothecary, as the crystallized acid is now manufactured very pure, and sufficiently reasonable, on a great scale. The theory of the process is very simple. The lime of the chalk unites with the citric acid which exists ready formed in the lemon-juice, the carbonic acid is expelled, and an insoluble citrate of lime precipitates. Any mucilage it retains

may be removed by repeated washings; and the sulphuric acid, which is added to the dried citrate, decomposing it, owing to the superior affinity of the sulphuric acid for lime, an insoluble sulphate of lime forms, and is precipitated, while the citric acid is disengaged, remains in a solution, and is crystallized by evaporation. The crystals of the first crystallization are dark-coloured; partly owing to a portion of mucilage which still adheres to the citric acid, and partly to the excess of sulphuric acid acting on the citric acid and decomposing a portion of it. The repeated crystallizations free the crystals from this dark colour; but as it is of some importance to avoid any hurtful excess of sulphuric acid, and as the strength of lemon-juice is variable and uncertain, it is better to determine the quantity of acid required by the quantity of chalk employed. For this purpose a portion of the sulphuric acid intended to be used must be previously saturated with the chalk, and the weight of the portion employed accurately ascertained; by the knowledge of which the exact quantity of sulphuric acid required to decompose the citrate may be found. According to the experiments of Proust[1]; 94 ounces of lemon-juice saturate 4 ounces of chalk with citric acid, and produce $7\frac{1}{2}$ ounces of dry citrate, which require for their decomposition, and the complete saturation of the lime they contain, 20 ounces of diluted sulphuric acid, composed of one part of the common acid, and three parts of water, or of a specific gravity of 1·15. To ascertain, however, the exact point of saturation of the lime with the sulphuric acid, take a little of the clear supernatant fluid, filter it, and add to it a few drops of acetate of lead; if no sulphuric acid be present, citrate of lead only will be formed, soluble in nitric acid, which does not dissolve sulphate of lead.[2]

Qualities. — Pure citric acid is in white, transparent, prismatic crystals. The primary crystal is a short, right rhomboic prism; in general, however, it is variously modified. Its sp. gr. is 1·617. It is inodorous; has an extremely acid taste, and reddens strongly the vegetable blues. In a damp air, the crystals absorb moisture. Seventy-five parts of water at 60° Fahr. dissolve one hundred parts of this acid; and at 212°, twice their weight. It is less soluble in alcohol than in water. The weak solution, when long kept, is liable to become mouldy and to undergo spontaneous decomposition. Citric acid combines with the alkalies, earths, and metallic oxides, and forms citrates. It forms with barytic water a white precipitate which is soluble in ammonia. It is precipitated, also, by a solution of nitrate of silver, forming a citrate of silver, which de-

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[1] *Journal de Physique*, lii. 366.

[2] Citric acid may be also obtained from the juice of the cranberry, Vaccinium *Oxycoccus;* bird-cherry, Prunus *Padus;* bitter-sweet, Solanum *Dulcamara;* and dog-rose, Rosa *canina.*

flagrates. The sulphuric and nitric acids decompose it. Citric acid, as it exists in the citrates, as the dry silver salt, consists of 12 eq. of carbon + 5 eq. of hydrogen + 11 eq. of oxygen. Formula $C_{12} H_5 O_{11}$.

It is a tribasic acid, requiring 3 equivalents of base: it crystallizes either with 5 or 4 equivalents of water; in either case 3 of these equivalents are basic water. From a cold solution it is deposited with 5 equivalents; its formula is then $(C_{12} H_5 O_{11} + 3 HO) + 2 HO$.

Citric acid is sometimes adulterated with tartaric acid; or with citrate of lime. The first is discovered by adding to the solution of the acid to be tested a solution of acetate of potassa, when an insoluble bitartrate, in small brilliant crystals, will be formed if tartaric acid be present; the second is detected by dissolving the crystals in water, saturating the solution with ammonia, and adding to it some oxalate of ammonia, which will instantly precipitate lime if present. If it be mixed with sulphate of potassa, the solution will yield with chloride of barium a precipitate, which is insoluble in nitric acid. Any substance remaining when the acid is subjected to the action of fire, is an impurity. In the London Pharmacopœia, the following characters of this acid are given. "It is devoid of colour, totally or almost entirely dissipated by heat. Soluble in water and spirit. The precipitate produced by acetate of lead is dissolved by nitric acid. No potash salt except the tartrate, causes any precipitate with it. When added to cold lime-water sparingly, it does not render it turbid. 100 grains dissolved in water are saturated by 205·7 grains of the crystals of carbonate of soda."

Medical properties and uses. — The solution of this acid in water, in the proportion of nine drachms and a half of the crystals to O j. of water, answers nearly all the purposes of recent lemon-juice for forming the common effervescing draught with carbonate of potassa.

A solution of ℈ j. in O j. of water, sweetened with sugar that has been rubbed on fresh lemon peel, forms a grateful refrigerant beverage, resembling lemonade; and which is equally useful in febrile and inflammatory complaints. It is said that the crystallized acid is not so useful in scurvy as the juice of the fresh fruit.[1] Citric acid is incompatible in formulæ with the alkalies, the alkaline and earthy carbonates and acetates, the earthy and alkaline sulphurets, soaps, and tartrate and bitartrate of potassa.

The following Table shows the quantity of citric acid required to saturate one scruple of the alkaline salts mentioned in it: —

[1] The Editor, from numerous trials, is quite convinced of its inefficacy in the treatment of scorbutus or scurvy.

Alkaline Salts.	*Citric Acid.*
Bicarbonate of Soda, gr. xx.	gr. x.
Carbonate of Soda, gr. xx.	gr. xij.
Bicarbonate of Potassa, gr. xx.	gr. xiv.
Carbonate of Potassa, gr. xx.	gr. xvij.
Sesquicarbonate of Ammonia, gr. xx.	gr. xxiv.

Officinal preparation.—*Syrupus Acid Citrici*, D.

ACIDUM GALLICUM, Dub. *Gallic Acid.* Now introduced into the London and Dublin Pharmocopœias. Contained in the list of the Materia Medica of the former, but among the preparations of the latter.

"Take of galls, in coarse powder, *one pound;* distilled water, *as much as may be necessary.* Having placed the galls in a porcelain dish pour on as much water as will convert them into a thick paste, and keep them in this moistened condition for six weeks, at a temperature of between 60° and 70° Fahr. adding water from time to time, so as to supply what is lost by evaporation. Let the residue be boiled for twenty minutes, with forty-five ounces of water, and then placed on a calico filter. The filtered solution, on cooling, will afford a copious precipitate. Let this be drained on a calico filter, then subjected to strong expression, after having been first enveloped in blotting paper, and again dissolved in ten ounces of boiling water. When upon ceasing to apply heat the solution has cooled down to 80° Fahr., pour it off from the crystals which have formed, and having washed these with three ounces of ice-cold water, dry them, first on blotting paper, and finally by a steam or water heat. By boiling the undissolved portion of the galls with forty-five additional ounces of water, filtering into a capsule containing the liquor decanted from the crystals formed in the preceding process, evaporate down to the bulk of ten ounces, and cooling to 80° Fahr. an additional quantity of the crystallized acid will be obtained."

Or, "Take of powdered galls, one pound; oil of vitriol of commerce, twenty-six fluid ounces; water, five pints and fourteen ounces. Steep the galls for twenty-four hours in one pint of the water, then transfer them to a glass or porcelain percolator; and

pour on a pint and a half of the water in successive portions. Dilute five ounces of the oil of vitriol with an equal bulk of water, and, when the mixture has cooled, add it to the infusion obtained by percolation, stirring well, so as to bring them into perfect contact. Let the viscid precipitate which forms be separated by a filter, and, to the solution which passes through, add five ounces more of the oil of vitriol, which will yield an additional precipitate. This being added to that previously obtained, let both be enveloped in calico, and subjected to powerful pressure. Dissolve the residue in the rest of the oil of vitriol, this latter being first diluted with what remains of the water; boil the solution for twenty minutes, then allow it to cool, and set it by for a week. Let the deposit which has formed at the end of this period be pressed, dried, and then dissolved in three times its weight of boiling water, clearing the solution, if necessary, by filteration, and, when it has cooled down to 80°, decant the liquid from the crystallized sediment which has formed, and wash the latter with three ounces of ice-cold water. Finally, let it be transferred to blotting paper, and, when deprived by this of adhering liquid, let it be dried perfectly, at a temperature not exceeding 212°. The gallic acid obtained by either of the preceding processes, may be rendered nearly white, by dissolving it in twenty times its weight of boiling distilled water, and causing the solution to traverse a stratum of prepared animal charcoal, spread upon a calico filter. When the liquid passes through colourless, it should be evaporated to one-sixth of its volume, and then suffered to cool, in order to the separation of the crystallized acid."

Galls contain a large amount of tannin or tannic acid, and, when exposed to the action of air and moisture, as occurs in the first of the above processes, this acid is decomposed, and converted into gallic acid; the change is usually stated to be due to the absorption of oxygen from the air, and to be accompanied by the evolution of carbonic acid. When the change is complete, the residue is boiled in water, by which means the gallic acid is dissolved from the insoluble residue, and, after filtration, is again deposited on cooling, the acid being pretty soluble in boiling but very slightly soluble in cold water. When tannic acid is heated to the boiling point with diluted sulphuric acid, it is nearly wholly converted into gallic acid; and the second process, ordered by the Dublin College, is based on this principle; the explanation of the process is by no means understood, nor has the relation between tannic and gallic acids been fully investigated.

Qualities.—Gallic acid, when pure, occurs in the form of white, feathery, acicular crystals, of a silky lustre, but, as found in commerce, it has usually a brownish tint. It is soluble in three parts of boiling water, but requires 100 parts of that fluid when cold; the solution has an acid reaction, and is astringent, decom-

posing when kept; it is very soluble in alcohol, slightly so in ether. Its solution does not precipitate gelatin, or proto-sulphate of iron, but with the persalts a deep bluish-black precipitate is produced, which, when the solution is heated, disappears from the gallic acid, reducing the persalt of iron to the condition of a proto-salt. When heated to 420° Fahr. it is decomposed, pyro-gallic acid sublimes, and carbonic acid is given off. Gallic acid is bibasic. Formula of the acid, dried at 212° Fahr. is $C_7 H O_3 + 2 H O$. The crystals contain 1 eq. of water of crystallization.

Medical properties and uses.— Gallic acid is one of the most powerful vegetable astringents with which we are acquainted; when taken into the stomach it acts as a local astringent, but by no means so powerfully as tannin; it is then absorbed, and produces through the medium of the circulation its remote astringent effects. It can be employed with the greatest advantage in all forms of passive hæmorrhages; also to restrain various other abnormal discharges. It has been found very serviceable in menorrhagia, hæmoptysis, hæmatemesis, hæmaturia, &c.; also in leucorrhœa, and in checking profuse sweating, and profuse expectoration: it has also been used, and it has been stated with much advantage, in some cases of albuminuria, the discharge of the albumen being greatly lessened by its administration. When gallic acid is given internally, the urine acquires the property of striking black with salts of iron.

Dose.— Grs. iij. to grs. x. in pill, or in solution; it must, however, be borne in mind that the acid is very sparingly soluble in cold water.

ACID HYDROCHLORICUM, called ACIDUM MURIATICUM PURUM, Edin. Dub. *Pure Muriatic Acid. Pure Hydrochloric Acid.*

"Purify muriate of soda, by dissolving it in boiling water, concentrating the solution, skimming off the crystals as they form on the surface, draining from them the adhering solution as much as possible, and subsequently washing the crystals slightly with cold water. Take of this salt, well dried, of pure sulphuric acid, and of water, *equal weights.* Put the salt into a glass retort, and add the acid, previously diluted with a third part of the water, and allowed to cool. Fit on a receiver which contains the rest of the water. Distil with a gentle heat, by means of a sand-bath, or naked gas flame, as long as any liquid passes over, preserving the receiver constantly cool by snow or a stream of cold water.

"The specific gravity of this acid is, to that of distilled water, as 1·170 to 1·000."

Dublin.

"Take of dried chloride of sodium, *three pounds;* oil of vitriol of commerce, *forty-four fluid ounces;* water, *thirty-two ounces;* distilled water, *forty-four ounces:* dilute the oil of vitriol with the thirty-two ounces of water, and, when the mixture has cooled, pour it upon the salt, previously introduced into a globular flask, having a capacity of at least one gallon. A gentle heat being now applied, let the muriatic acid gas, as it escapes, be conducted into a bottle containing the distilled water, by means of a bent tube, dipping about half an inch beneath its surface, and let the process be continued until the product measures three pints. Throughout this operation, particularly towards its close, the temperature of the water which absorbs the gas must, by the application of external cold, be prevented from rising.

"The specific gravity of this acid is 1176."

Syn. Acide Hydrochlorique, Acide Muriatique, Acide Chlorohydrique (*F.*), Salzsäure (*G.*), Zoutzuur (*Dutch*), Solnaia kislota (*Russ.*), Acido Muriatico, A. Hydrochlorico (*I.*), Ooppoo trāvagum (*Tam.*).

The principal difference in these formulæ is the purification of the salt as ordered by the Edinburgh College; and the quantity of sulphuric acid ordered for decomposing the chloride. The sulphuric acid is properly directed to be diluted, to moderate the strong action, and to prevent the too rapid disengagement of the hydrochloric acid gas, which would both endanger the bursting of the apparatus, and render the process otherwise very unmanageable. The process of the Edinburgh College is intended to obtain the acid in its purest form; and certainly the mode of purifying the salt which it has adopted is preferable to the mere exsiccation. The purer the sulphuric acid, the less chlorine is evolved; and as chlorine gives colour as well as iron, it is of importance that the sulphuric acid should contain no nitrous gas, which most of the commercial acid does. In the manufacturing laboratories, although the process is in principle the same as the above, yet the retort is generally of earthenware or of iron, the latter of which communicates the yellow colour that characterises the common hydrochloric acid, and which depends on a small portion of iron being raised and brought over with the acid. Even when iron vessels are not employed, the acid often assumes a yellowish colour, which depends, as already stated, on the presence of some chlorine. The acid is rendered pure by redistillation. Whichever process is adopted, the retort should be very capacious, and the receiver not too closely luted.

These processes are easily explained. Common salt is a compound of chlorine and sodium; and, when the sulphuric acid is added to the salt, the equivalent of water in the acid is de-

composed, its oxygen unites to the sodium, and forms soda, which combining with the sulphuric acid produces a sulphate of soda, while its hydrogen combines with the chlorine, and forms anhydrous hydrochloric acid, a gaseous fluid consisting of equal volumes of hydrogen and of chlorine, or 1 eq. of hydrogen + 1 of chlorine, which dissolving in the water contained in the receiver constitutes the liquid acid.[1] The residue of the process is sulphate of soda with an excess of acid, or a bisulphate; to separate which, without breaking the retort, boiling water may be poured into the vessel, after its contents have cooled down to 212°.

Qualities. — Liquid hydrochloric acid, thus obtained, when pure, is a colourless or very pale straw-coloured fluid; it has a strong pungent odour, and an intensely sour taste; it reddens strongly the vegetable blues, emits white suffocating fumes when exposed to the air, and erodes animal and vegetable substances. It is wholly vaporized by heat, appearing to boil, but no real ebullition takes place till its density falls to 1090, owing to the extrications of the gaseous acid. When it acts upon metals or metallic oxides, chlorides are formed: in the first instance, the hydrogen of the acid is given off in a gaseous form, and the chlorine unites with the metal; in the second, the hydrogen unites with the oxygen of the oxide, and forms water. The acid ordered by the London College has the sp. gr. 1·160, and consists of nearly 32·32 per cent. of real acid gas, and 67·68 of water: 100 grains of it should saturate 132 grains of crystallized carbonate of soda. The acid made by the Edinburgh process has the density 1170; that by the Dublin process 1176. Impure muriatic acid is contained in the lists of both Edinburgh and Dublin Pharmacopœias. That in the Edinburgh is stated to be always yellow, containing commonly a little sulphuric acid, oxide of iron, and chlorine, with a density at least 1180. The following part of a table, constructed by Mr. E. Davy, shows the quantity of real hydrochloric acid gas contained in 100 parts of fluid acid of different densities, at the temperature of 60°: —

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[1] Pure gaseous hydrochloric acid is compressed into a liquid under a pressure of forty atmospheres at 50° Fahr.

Spec. Grav.	Real Acid Gas.	Spec. Grav.	Real Acid Gas.	Spec. Grav.	Real Acid Gas.
1·21	42·43	1·14	28·28	1·07	14·14
1·20	40·80	1·13	26·26	1·06	12·12
1·19	38·38	1·12	24·24	1·05	10·10
1·18	36·36	1·11	22·30	1·04	8·08
1·17	34·34	1·10	20·20	1·03	6·06
1·16	32·32	1·09	18·18	1·02	4·04
1·15	30·30	1·08	16·16	1·01	2·02

The acid should be perfectly colourless; entirely dissipated by heat; and, when diluted with distilled water, it should afford no precipitate by either chloride of barium or ammonia.

The fluid hydrochloric acid found in the shops often contains sulphuric acid, sometimes nitric, with small portions of sesquioxide of iron, or sulphate of potassa, or chloride of sodium; the first is detected by diluting the acid with 5 or 6 parts of distilled water, and adding a few drops of chloride of barium[1], which is precipitated white if sulphuric acid be present; nitric acid is detected by the property of dissolving gold leaf; iron is discovered by ferrocyanide of potassium, producing Prussian blue. If much chlorine be present it will decolorize solution of indigo. It is also often of a sp. gr. 1·116, containing scarcely three-quarters of the proper quantity of real acid.[2] These impurities are removed by diluting the acid with an equal volume of water, and re-distilling in glass vessels. In the London and Edinburgh Pharmacopœias the tests for the purity of this acid are the same as those given above. In addition, however, to these, it is stated by the London College that, after the acid has been boiled with gold leaf, it should give no precipitate with proto-chloride of tin.

Medical properties and uses. — This acid is tonic and antiseptic, corrosive and poisonous. Internally administered, it has been efficaciously used in typhus fevers, and in some cutaneous eruptions. It is a common and useful adjunct to gargles, in the proportion of from f ʒ ss. to f ʒ ij. in f ℥ vj. of any fluid, in ulcerated sore throats, and scarlatina maligna; and, in a very highly diluted state, viz. ♏ viij. in f ℥ iv. of water, it has been recommended as an injection in gonorrhœa.

This acid has even been regarded as an antidote in general syphi-

[1] Strong hydrochloric acid precipitates chloride of barium when no sulphuric acid is present; but this does not happen when the acid is much diluted.

[2] *Pharm. Journ.* vol. ii. p. 320.

litic affections; but the observations of Mr. Pearson have proved this opinion to be erroneous; yet, by its salutary effects on the stomach and general health, "it is a medicine capable of ameliorating the appearance of venereal ulcers, and of restraining for a time the progress of the disease," where it is desirable "to gain a little time, previously to the entering on a mercurial course."[1] The dose is from ♏ x. to ♏ xx. in a sufficient quantity of water, or in any bland fluid. It is incompatible in prescriptions with alkalies and their carbonates, most of the earths, and the oxides, sulphuret of potassium, tartrate of potassa, potassio-tartrate of antimony and of iron, nitrate of silver, and the acetates of lead. In typhus fever, and fevers of a typhoid type, I have generally given it in the infusion of cinchona or cusparia bark. Dr. Paris states that he has found it a preventive of the generation of worms, when given after copious evacuations of the bowels.[2] Largely diluted in any mucilaginous fluid, and sweetened, it is a useful remedy in calculous cases depending on an excess of the phosphates.

When hydrochloric acid is taken as a poison, it may be detected by its sensible qualities: but if mixed with wine or other fluids, let a portion of it be distilled from a small retort over a candle, into a phial containing a solution of nitrate of silver: the precipitation of chloride of silver, which is soluble in ammonia, but not in nitric acid, will take place if the fluids contain hydrochloric acid. The best antidotes, if exhibited in time, are soap and calcined magnesia, suspended in water.

A very important property of this acid, in the state of gas, is the power it possesses of neutralizing putrid miasmata, discovered by Morveau in 1773. It was therefore used as an agent for destroying infection in sick rooms and hospitals, disengaged by pouring sulphuric acid on common salt: its use is now superseded by chlorine, which possesses disinfectant powers in an eminent degree.

Officinal preparations.—*Acidum Hydrochloricum Dilutum*, L. *Acidum Muriaticum Dilutum*, E. D. *Acidum Nitro-muriaticum*, D.

ACIDUM HYDROCHLORICUM DILUTUM, Lond.

Acidum Muriaticum dilutum, Edin. Dub. *Diluted Hydrochloric* or *Muriatic Acid.*

"Take of hydrochloric acid, *five fluid ounces;* distilled water, *fifteen fluid ounces.* Mix.

"Its specific gravity is 1·043. A fluid ounce of this acid is saturated by 168 grains of the crystals of carbonate of soda."

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[1] *Pearson on Remedies for Lues Venerea*, 194.

[2] *Pharmacologia.*

Edinburgh.

"Take of muriatic acid, *four fluid ounces;* distilled water, *twelve fluid ounces.* Mix them together. The density of this preparation is 1050."

Dublin.

"Take of pure muriatic acid, *four fluid ounces;* distilled water, *thirteen ounces.* Mix. The sp. gr. of this acid is 1045."

These formulæ are intended to render the dose of the acid more easily apportioned. The dose is ♏ xx.

ACIDUM HYDROCYANICUM DILUTUM, Lond. Dub. *Acid Hydrocyanicum,* Edin. *Diluted Hydrocyanic Acid.*

"Take of ferrocyanide of potassium, *two ounces;* sulphuric acid, *seven fluid drachms;* distilled water, *a pint and a half.* Mix the acid with four fluid ounces of the water, and put it into a retort; to these, when they have cooled, add the ferrocyanide of potassium dissolved in half a pint of the water. Pour f ℥ viij. of the water into a cooled receiver; then, having fitted to it the retort, distil f ℥ vj. of the acid, with the gentle heat of a sand-bath, into this water. Lastly add f ℥ vj. of distilled water to this acid, or as much as suffices, that 12·59 grains of nitrate of silver dissolved in distilled water may be accurately saturated by 100 grains of this acid."

Edinburgh.

"Take of ferrocyanide of potassium, *three ounces;* sulphuric acid, *two fluid ounces;* water, *sixteen fluid ounces.* Dissolve the salt in eleven fluid ounces of the water; and put the solution into a mattrass with a little sand; add the acid previously diluted with five fluid ounces of water and cooled; connect the mattrass with a proper refrigeratory; distil with a gentle heat, by means of a sand-bath, or naked gas-flame, till fourteen fluid ounces pass over, or till the residuum begins to froth up. Dilute the product with distilled water till it measures sixteen fluid ounces."

Dublin.

"Take of ferrocyanide of potassium *two ounces;* oil of vitriol of commerce, *one fluid ounce;* water, *twelve ounces.* Dissolve the salt in eight ounces of the water, and dilute the oil of vitriol with the remaining four ounces. When both solutions are cold, introduce them successively into a retort or mattrass, containing several slips of platinum foil, and connected in the usual manner with a Liebig's condenser; and with the aid of a gentle heat, let eight ounces be distilled over. Finally, dilute the product with eight ounces of distilled water, or so that the volume of the diluted

acid shall be sixteen fluid ounces. The specific gravity of this acid is 997."

This acid is found in the distilled water of many vegetable productions; the bark of the Cerasus *padus*, or bird-cherry; the leaves of the Cerasus *lauro-cerasus*, C. *virginiana*, and of the peach and nectarine trees; in bitter almonds, and the kernels of many fruits: but, for the purposes of medicine, it is artificially prepared.

In the above processes, the ferrocyanide of potassium is decomposed by the sulphuric acid.

When two equivalents of the ferrocyanide are heated with six of sulphuric acid, three equivalents of the cyanide of potassium which it contains are decomposed, and also three equivalents of water; the oxygen of the latter combining with the potassium of the cyanide converts it into potassa, which unites with the six equivalents of sulphuric acid, and forms a bisulphate of potassa; whilst the three equivalents of hydrogen unite with the three equivalents of cyanogen which are set free, and form with them three equivalents of hydrocyanic acid. According to Mr. Everitt, whose explanation of the process this is, there remain one equivalent of cyanide of potassium, two equivalents of cyanide of iron; and these combining form what he terms a *yellow salt*, the constitution of which is the opposite of that of the ferrocyanide of potassium, in reference to the proportion of the cyanides.

I find that this yellow salt is only obtained when the process is stopped at the point directed in the Pharmacopœia: but when it is carried on to extreme dryness, an additional quantity of the hydrocyanic acid is procured, and the residue consists of bisulphate of potassa, and Prussian blue.

The process of the Edinburgh and Dublin Colleges are similar to that of the London in all the essential points.

Various other processes may be employed for furnishing this acid.

It was proposed by Dr. Clark to dissolve ʒ viij. ¼ of cyanide of potassium in f ʒ c. of distilled water, and add ʒ xviij. ¾ of tartaric acid dissolved in f ʒ xx. of distilled water. In this case, the oxygen which is required to be added to the potassium to form it into potassa, and the hydrogen to the cyanogen to form the hydrocyanic acid, are obtained from the decomposition of the water. The insoluble residue is bitartrate of potassa. Mr. Laming adds alcohol, instead of a portion of the water, to aid the precipitation of the bitartrate, and to preserve the acid from decomposition. By this process hydrocyanic acid is readily procured; but it is difficult to apportion the quantity of the cyanide, as that salt is attractive of water, and yet retains its crystalline form. Mr. Donovan found that 100 grains, heated to redness, and then exposed to a moist atmosphere in three days' attracted water, sufficient to

augment its weight nearly one fourth, whilst its appearance was such as might have led to its employment for making the hydrocyanic acid. Still this process is a quick method of procuring the acid: but, when it is used, the cyanide should be first submitted to a red heat; and the strength of the acid is determined by the solution of nitrate of silver, as directed in the formula of the London College.

Hydrocyanic acid may also be procured from the decomposition of bicyanide of mercury, or cyanide of silver, by hydrochloric acid, or by passing sulphuretted hydrogen gas over cyanide of mercury, or into a solution of the salt.

Physical and chemical properties. — Hydrocyanic acid, prepared by the above-described processes, is a colourless, transparent liquid, with an odour which is not, as supposed, like that of bitter almonds, but is peculiar to itself. It is at first cooling, bland, and sweetish to the taste, but ultimately it impresses a pungent acrimony and bitter taste on the palate. It is very volatile. It combines in every proportion both with water and alcohol. It should leave no residue on evaporation. It is, when pure, readily decomposed by light: it should, therefore, be kept in an opaque stoppered bottle. Hydrocyanic acid is composed of slight equivalents of cyanogen and hydrogen, and the formula for the pure acid is C_2 N, H. Cyanogen is a compound, consisting of 2 eq. of carbon, 1 eq. of nitrogen; or it is a bicarburet of nitrogen. The acid employed in medicine is very dilute. According to the London College, the medicinal acid should be "free from colour; by heat it is dissipated in vapours exhaling a peculiar odour. It turns litmus of a slight fugaceous red colour; does not redden the iodo-cyanide of potassium and mercury; is not coloured by sulphuretted hydrogen, nor precipitated by chloride of barium. In 100 grains of this dilute acid, two grains of hydrocyanic acid are contained." The not reddening the mercurial salt shows the absence of any foreign acid. It is, however, said, that a small amount of some strong acids aids in the preservation of hydrocyanic acid. In the Edinburgh Pharmacopœia, the medicinal acid, which is not called dilute, is said to be real hydrocyanic acid, diluted with about thirty parts of water, or contains about 3·22 per cent. of real acid; its strength is ordered to be ascertained by its power of precipitating nitrate of silver. The strength of the Dublin acid is to be ascertained by its specific gravity, which is stated to be ·997; but this is a very uncertain method, and not much to be depended upon; the amount of real acid is about 2 per cent., the same as the London preparation.

Medical properties and uses. — Hydrocyanic acid, when taken into the stomach in a large dose, acts as an instantaneous and most powerful sedative poison, destroying completely the nervous energy and the irritability of the body, and consequently extinguishing life; but in an animal thus killed, the action of the heart

continues for some time after the animal has apparently ceased to live. The observation of this curious fact led Professor Brera, in 1809[1], to administer hydrocyanic acid as a remedy in pulmonary inflammation; and he found that it quickly subdued the violence of the disease, "without having any recourse to more than one preliminary bleeding." British practitioners, however, were altogether unacquainted with this remedy, until after Dr. Majendie published his first essay on this subject in 1815; when Dr. Granville, through the medium of the London Medical Repository, directed their attention to its powers; and I refer those who are desirous of tracing the introduction of hydrocyanic acid into use, as a medical agent, to his treatise subsequently published on the internal use of this acid.[2]

Hydrocyanic acid, *internally* exhibited, is a remedy of great efficacy in spasmodic coughs of every description, particularly those of asthma, chronic bronchitis, and hooping-cough. It has also been employed with success in palpitations of the heart.[3] In my own practice, I have witnessed its powers in that affection of the *trachea* which is often mistaken for *phthisis pulmonalis.* In true tubercular phthisis, my own experience does not enable me to say much in favour of this acid. It, nevertheless, sometimes diminishes the violence and the frequency of the cough, and allays the dyspnœa and the difficulty of expectoration. It has been found extremely useful in the treatment of those epidemic catarrhs with which this country is occasionally visited; and no remedy is so well adapted as an adjunct to tonics, for removing those dyspeptic affections which are attended with irritability of the mucous membranes of the stomach, and accompanied with heat and soreness, and the elongation of the papillæ of the tongue. In these cases it reduces the morbid irritability of the stomach, and enables the juices of that organ to be more slowly secreted, and of a more healthy character.[4] M. Heller recommends it in aneurism of the heart and aorta.[5] Cases are also on record in which this acid has proved serviceable in the treatment of painful and difficult menstruation, floodings, hæmoptysis, and nervous diseases. It certainly

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[1] Brera's work is entitled " Prospetti dei risultamenti ottenuti nella Clinica Medica dell' Imperiale R. Università di Padova, ne' sei anni scolastici, 1809—1815."

[2] *Treatise on the Internal Use of Hydrocyanic Acid*, &c., 2d edition, London, 1820.

[3] *London Med. and Phys. Journ.* Nov. 1823.

[4] Dr. Elliotson published a small volume containing the result of his practice with hydrocyanic acid in dyspepsia; and has stated that accident led him to try the powers of the medicine in this class of diseases. Respect for my own character obliges me to say, that nothing could surprise me more than this statement of Dr. Elliotson; as he acknowledges having read the first edition of Dr. Granville's treatise, which contains a letter from me, dated 20th February, 1819, stating my opinion as to the utility of this acid, in dyspepsia, and explaining the modus operandi of the remedy, previously to his having employed it.

[5] Vide *Traité de la Nécessité de ne point insister sur l'Usage intérieur des Excitans dans l'Empoisonnement par l'Acide Hydrocyanique.* Par H. S. Heller. Paris, 1824.

is a very powerful sedative; and may be employed in all cases in which sedatives and narcotics are indicated with decided advantage.

As a *local remedy,* hydrocyanic acid is the only application which can be depended on for allaying the itching and tingling so distressing in impetiginous affections. It may be combined with liquor potassæ, or acetate of ammonia, or even acetate of lead, in various proportions, according to the nature of the individual case; but f℥ jss. to f ℥ viij. of water is the average quantity. I have employed it with unvarying success in these complaints; and having published my observations [1], its value has been determined in the hands of others. I have found it useful, also, in combination with small doses of bichloride of mercury, in acne *rosacea,* and several other cutaneous diseases.

The dose of the diluted hydrocyanic acid, P. L., is from ♏ iij. to ♏ viij. It may be administered in distilled water, or in almond emulsion, or in infusion of cinchona bark, as circumstances require. When an over-dose has been taken, its deleterious effects are best counteracted by inhaling largely diluted chlorine, by taking hot brandy and water, the ammoniated tincture of iron, by pouring cold water on the head, and by artificial respiration. M. Heller recommends bleeding, ammoniacal frictions, and acidulated drink; but more reliance is to be placed on stimulants. As a local application, it may be used in the form of lotion, in the proportion of a fluid drachm to six fluid ounces of distilled or of rose water; or as a cataplasm, composed of crumbs of bread, soaked in a solution of f ʒ jss. of the acid in f ℥ j. of distilled water. It is incompatible in prescriptions with nitrate of silver, the salts of iron, and the mineral acids. [2]

Mode of detecting Prussic Acid. — Although the instantaneous power of hydrocyanic acid, in destroying animal life, when it is taken in doses sufficiently large to operate as a poison, may, perhaps, always prevent medical art from proving beneficial in such cases; yet it is of importance to be able to ascertain, in judicial inquiries relative to suicide or to murder, that this acid has been administered as a poison. This may be done if the body be opened from eighteen to forty-eight hours after death. Collect the blood contained in the ventricles of the heart, a portion of the contents of the stomach, and of any fluid that may be found in the

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[1] Vide *Medical and Physical Journal,* Feb. 1822.

[2] As the volatility of hydrocyanic acid impairs its strength, in compounding medicines with it, the cyanide of potassium has been recommended as a substitute for it. See a paper on this subject, and on the mode of preparing the cyanide, by Professor Donovan. An extemporaneous hydrocyanic acid may be prepared from the cyanide in the following manner: — ℞. Cyanidi Potassii, gr. j. Aquæ distillatæ, f ℥iij ss. Syrupi Limonum, f ʒ iv. Misce. Divide in haustus octo. Sumatur unus pro dosi — See *Pharm. Journ.* ii. 573.

head, the chest, or the abdomen; agitate the mixture for some time with distilled water, and filter the liquid, and distil at a low temperature. To a small quantity of the distilled liquid, add a few drops of a solution of pure potassa; then add a few drops of a solution of protosulphate of iron, containing some persalt, which is generally the case with the ordinary solutions; and if a precipitate of the colour of burnt terra Siena now falls down, which, on the addition of a little sulphuric acid, changes to a bluish green, and gradually, on exposure to the atmosphere, becomes a beautiful blue, we may certainly pronounce that hydrocyanic acid is present. Another mode of testing is that which M. Lassaigne has proposed. Suppose a practitioner is called to examine the body of a person who has been poisoned by hydrocyanic acid. The stomach is first to be examined entire, to ascertain whether the odour of the acid is perceptible in it; after which it is to be cut in pieces under *distilled* water, slightly acidulated with sulphuric acid, and a portion of it distilled with an equivalent proportion of the water, until one eighth of the liquid has passed into the receiver. That liquid is to be rendered slightly alkaline with potassa; then a few drops of a solution of sulphate of copper are to be added to a small portion of it; and afterwards a sufficient quantity of hydrochloric acid, to re-dissolve the excess of the oxide of copper. The liquid will appear more or less milky, according to the quantity of hydrocyanic acid present. This test will detect $\frac{1}{20000}$ of hydrocyanic acid in solution in water.[1] The presence of the acid in the stomach may be thus detected two or three days after death; but after that period its volatility dissipates it, and it is also decomposed.

ACIDUM NITRICUM PURUM. *Edin. Dub.*

"Purify nitrate of potash, if necessary, by two or more crystallizations, till nitrate of silver does not act on its solution in distilled water. Put into a glass retort equal weights of this purified nitrate, and of sulphuric acid; and distil into a cool receiver with a moderate heat from a sand-bath, or naked gas-flame, so long as the fused material continues to give off vapour. The pale-yellow acid thus obtained may be rendered colourless, should this be thought necessary, by heating it gently in a retort."

Dublin.

"Take of nitrate of potash, *two pounds;* nitrate of silver, *two drachms,* or *as much as may be necessary;* boiling distilled water, *five pints;* oil of vitriol of commerce, *seventeen fluid ounces:* dissolve the nitrate of silver in two ounces, and the nitrate of

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[1] *Annales de Chim.* xxvii. p. 200.

potash in the remainder of the water, and, by degrees, the former solution to the latter, until a precipitate ceases to fall. Pass now through a calico filter, and, having evaporated to perfect dryness the clear liquor thus obtained, introduce the residuum into a retort, whose neck is made to pass at least five inches into the glass tube of a Liebig's condenser; then pour upon it the oil of vitriol, and with a heat which, towards the close of the process, must be raised so as to liquefy the contents of the retort, cause the nitric acid to distil over. The specific gravity of the acid is 1500."

Syn. Acide nitrique (*F.*), Salpetersäure (*G.*), Zalpeterzuur (*Dutch*), Skedwatter (*Swed.*), Selitrennaia kislota (*Russ.*), Acido Nitrico (*I.*), Pottle Ooppoo trāvāgum (*Tam.*), Areki Shora (*Pers.*), Maulabker (*Arab.*).

In performing these processes it is advisable to use a retort with an adopter, and to place a small tube in the receiver, which should be tubulated for this purpose. The nitric acid is separated from its combination with potassa, in the nitrate, by the superior affinity of the sulphuric acid for the potassa; which, however, requires to be aided by quantity, a larger portion of sulphuric acid than is necessary for saturating the potassa of the nitrate being used; and also by heat, which volatilizes the nitric acid as it is disengaged. As soon as the materials are heated, if the proportion of sulphuric acid is large, the acid, in fumes, is almost immediately disengaged, and continues to be so until the ingredients in the retort are nearly dry, and the heat is augmented to 500°; but when this heat is maintained, owing to a partial decomposition of the acid next disengaged, nitrous gas comes over in deep-red fumes, with a quantity of permanently elastic, pure oxygen, which may be collected in an inverted receiver filled with water, placed in a pneumatic trough, and connected with the last of the receivers by means of a bent tube. The nitrous gas combines with the condensed acid in the receiver, and deepens its colour.[1] It is with the view of preventing this that the Colleges have ordered so large a portion of sulphuric acid to be employed, the principal use of which appears to be to convert the potassa into a bisulphate, so that a larger proportion of acid is procured; and, as less heat is required for the decomposition, little nitrous gas is formed; and the constitution of the acid is preserved. The residue in the retort is a white, spongy, saline cake of bisulphate of potassa, which may be dissolved out of the retort by hot water. It will be observed that the nitre is ordered to be free from chlorides, by repeated crystallizations,

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[1] For the preparation of this acid on a large scale in this country, rough nitre, with half the weight of sulphuric acid, is employed. These are put into a large glass or earthenware *body*, to which a glass pipe is luted, communicating with an empty receiver, which is connected, by means of pipes also, with several other receivers half filled with water.

in the Edinburgh process; but the Dublin College orders them to be precipitated by nitrate of silver.

Notwithstanding the excellence of these processes, the nitric acid is obtained not perfectly free from nitrous gas. Dr. Murray[1] justly remarks, that the heat of a water-bath is best adapted, and sufficient for the purpose of obtaining nitric acid, and not too great to produce the decomposition of the acid. A completely colourless acid, however, cannot be obtained, unless the acid be redistilled from a small portion of black oxide of manganese; but this is not at all necessary for medical purposes.[2]

As nitre sometimes contains a small portion of chloride of sodium, nitric acid may be contaminated with a portion of chlorine, which gives it colour; or it may contain some sulphuric acid. The presence of the first is detected by dropping in nitrate of silver, which forms an insoluble chloride of silver, if chlorine or any chloride be present; while the formation of a precipitate on the addition of nitrate of baryta discovers the second: but both the acid to be tested and the nitrate of baryta should be previously diluted with distilled water. If any undecomposed nitrate be present, it will be detected by evaporating a portion of the acid to dryness, when, if it contain no nitrate, it will leave no residue. These contaminations do not affect the medicinal virtues of the acid.

The acid ordered in the London list has the sp. gr. 1·43; the Dublin College directs it to be of sp. gr. 1·50; but the Edinburgh College, besides its acid of sp. gr. 1·500, admits also an acid of sp. gr. 1·380 to 1·390 in its list, and this is adequate for every pharmaceutical purpose. Indeed, when concentrated, the acid of commerce answers as well as the purer acid. To concentrate that acid, it should be distilled with spongy platinum in the retort, and one-third drawn off, which is more than one-half the water it originally contained; an equal volume of sulphuric acid is then to be added, and, the distillation being continued, a strong concentrated acid comes over. The product may contain a small quantity of sulphuric acid, which should be separated by a second distillation. If stronger than the pharmacopœial acid, it can be readily reduced by water to the proper density.

According to Sir H. Davy[3], the following are the proportions of real acid, in three states in which this acid is procured: —

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[1] *System of Materia Medica*, ii. 184.

[2] Nitric acid was first obtained by Raymond Lully, in the 13th century, by distilling a mixture of nitre and clay: a process still employed on the Continent. The name *nitric acid* was imposed in 1787, by the French chemists.

[3] *Researches*, 37.

100 Parts of	Spec. Gravity.	Real Nitric Acid.	Water.	Nitrous Gas.
Pale yellow Acid -	1·502	91·50	8·3	2·00
Bright yellow - -	1·500	88·94	8·10	2·96
Dark orange - -	1·480	86·84	7·6	5·56

Qualities. — *Liquid nitric* acid, sp. gr. 1·50, is a colourless, or very pale-yellow limpid fluid, emitting, when exposed to the air, white, suffocating vapours, and possessing strong acid properties. If it be heated in a retort it becomes colourless. The pure acid of sp. gr. 1·50 boils at 210°. It is highly corrosive, and tinges the skin yellow, the tint remaining till the epidermis peels off. When exposed to the air, it attracts moisture and becomes weaker. It unites with water in every proportion, and while mixing heat is evolved. One hundred grains of the officinal acid neutralize 217 grains of carbonate of soda. The acid of the shops has usually a sp. gr. 1·22. The following Table, constructed by Sir H. Davy[1], shows the quantity of real acid and water contained in 100 parts of fluid acid of different densities: —

100 Parts Nitric Acid of Specific Gravity	Contain of		100 Parts Nitric Acid of Specific Gravity	Contain of	
	True Acid.	Water.		True Acid.	Water.
1·5040	91·55	8·45	1·3186	52·03	47·97
1·4475	80·39	19·61	1·3042	49·04	50·96
1·4285	71·95	28·35	1·2831	46·03	53·97
1·3906	62·96	37·04	1·2090	45·27	54·73
1·3551	56·80	43·12			

Nitric acid is volatilized by heat, and decomposed by light. It is also decomposed by all the simple combustibles, and by some, namely, phosphorus, charcoal, and sugar, with great violence of action, which is accompanied with the evolution of copious red fumes. Nitric acid rapidly converts protosulphate of iron in solution into persulphate, changing the colour to deep olive: it reddens morphia, brucia, impure strychnia, and powder of nux vomica. When poured on some volatile oils, it sets them on fire; it is capable of oxidizing all the metals; and combines with the earths, alkalies, and metallic oxides[2], forming nitrates: one fluid ounce of specific

[1] *Researches*, p. 41.
[2] In its concentrated state it does not act upon the metals at ordinary temperatures;

gravity 1·500 should dissolve 476 grains of white marble. The constituents of nitric acid, as it exists in the nitrates, are 1 eq. of nitrogen and 5 eqs. of oxygen. Formula $N\,O_5$. The strongest acid which can be isolated is composed of 1 eq. of water, and 1 eq. of anhydrous acid, and has the sp. gr. 1·517 at 60° Fah. Formula $H\,O,\ N\,O_5$, it is a nitrate of water. The acid made by the Dublin and Edinburgh processes is a sesquihydrate, containing 3 eq. of water to 2 eq. of acid; that of the London College, sp. gr. 1·42, contains 4 eq. of water to 1 eq. of acid, and by Professor Graham it is supposed to be thus constituted: 1 eq. of the water is united to the acid to form a nitrate of water, and the remaining 3 eqs. are attached as water of crystallization. The probable formula is therefore $H\,O,\ N\,O_5 + 3\ H\,O$. One hundred grains of the London acid are saturated by 161 grains of the crystals of carbonate of soda.

The nitric acid of the shops often contains sulphuric acid, or chlorine, or nitrous gas. The first is detected by testing as already stated; the nitrous gas, by diluting the acid with twice its volume of water, and testing it with an aqueous solution of hydrosulphuric acid, which gives an opalescent appearance to the acid if the least trace of nitrous acid gas be present, owing to the liberation of sulphur.[1]

It is incompatible with sulphate of iron, and with oxides, earths, alkalies and their carbonates, and the sulphurets. It is, also, incompatible with tinctures made with rectified spirit.

Medical properties and uses. — Strong fluid nitric acid is seldom employed except for pharmaceutical purposes; but it is used as an escharotic in sloughing phagedænic ulcers, as suggested by Mr. Welbank. To employ it properly, the surface of the ulcer must be well cleansed and dried, and, after applying a thick coating of lard to protect the surrounding sound skin, a pledget, moistened with the undiluted acid, must be pressed steadily on every point of the diseased surface, which by this treatment soon throws off a slough, and assumes an healthy aspect.[2] When extricated in the form of vapour, it is employed for destroying contagion. It is less powerful than the chlorine, but it can be extricated in the chambers of the sick without proving uncomfortable.[3] For this purpose f ʒ ij. of sulphuric acid may be poured over ʒ iv. of coarsely powdered nitre in a china cup, and placed in a pipkin of hot sand. This quantity is sufficient for fumigating a room of ten feet square; and, where a larger portion is required, it is more advisable to

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but when slightly diluted, it quickly oxidizes them and dissolves the oxides. This is owing to the decomposition of the water, which yields up its oxygen to the metal, which in a state of oxide is readily soluble in the acid. It does not act on platinum or gold.

[1] M. Millan, *Journ. de Pharmacie.* Quoted in *Pharmaceutical Journ.* ii. p. 335.

[2] *Medico-Chirurg. Trans.* vol. ix. p. 69.

[3] *The Effects of Nitrous Vapour, &c.* By J. C. Smyth, M.D.

multiply the number of pipkins, than to put a larger quantity of the materials into one vessel.

Officinal preparations. — *Acidum Nitricum dilutum,* L. E. D. *Acidum Nitro-Muriaticum,* D.

ACIDUM NITRICUM DILUTUM, Lond. Edin. Dub. *Diluted Nitric Acid.*

"Take of nitric acid, *three fluid ounces;* distilled water, *seventeen fluid ounces.* Mix. Its specific gravity is 1·082. A fluid ounce of this acid is saturated by 154 grains of the crystals of carbonate of soda."

Edinburgh.

"Mix together *one fluid ounce* of pure nitric acid (sp. gr. 1500), and *nine fluid ounces* of distilled water. If the commercial nitric acid of sp. gr. 1390 be used, *one fluid ounce* and *five fluid drachms and a half* are required. The density of this diluted acid is 1077."

Dublin.

"Take of pure nitric acid, *four fluid ounces;* distilled water, *twenty-nine ounces.* Mix. The specific gravity of this acid is 1092."

These processes are intended for the more convenient apportionment of the dose in the exhibition of this acid. The London and Edinburgh acids have nearly the same strength, the Dublin is somewhat stronger.

Medical properties and uses. — Nitric acid is tonic and antiseptic. When very largely diluted with water, it forms an agreeable and very useful beverage in fevers, particularly of the typhoid type. In larger doses, less diluted, it has been efficaciously administered in chronic hepatitis, even when dropsy has supervened: and it has also been found serviceable in restraining violent sickness, in dyspepsia, asthma, and the majority of the cachexiæ. From some observations of Dr. Scott, published at Bombay, in 1796, this acid excited considerable attention as a remedy for syphilis; but after the most ample trials, by almost every practitioner of any eminence in the country, its anti-syphilitic powers have not been found by any means to answer the accounts of them transmitted from India. The subsequent publications of Dr. Scott, however, have shown, that he did not employ nitric acid, but a mixture of three parts of hydrochloric acid, and two of nitric acid. Nitric acid checks for a time the progress of the disease, but does not permanently remove the symptoms; and as Mr. Pearson justly remarks, "it would by no means be warrantable to substitute the nitrous (or nitric) acid in the place of mercury, for the cure of venereal[1] com-

[1] *Pearson on Remedies for Lues Venerea,* 188.

plaints." It is, however, in many cases, of much benefit during a mercurial course, or prior to its commencement, when the constitution is impaired, and inadequate to support the effects of mercury; as by its tonic powers it promotes the general health, and lessens the action of the mercurial remedy on the mouth and fauces; yet, when it is pushed far, it affects the mouth and produces ptyalism.[1] When dropsy supervenes on reiterated courses of mercury, which is not unfrequent in broken-down constitutions, this acid, Mr. Carmichael observes, given in as large doses as the stomach will permit, conjoined with digitalis, is productive of the utmost benefit. We have found it of considerable service, given at the same time with mercury, in old obstinate ulcerations of the legs, although no venereal taint could be suspected; and it is employed with benefit as a local stimulant, in the form of lotion, in the proportion of f ʒ ij. of the diluted acid to O j. of water, to fœtid ulcers, attended with a thin ichorous discharge, and in caries of the bones. In India, and in this country, for some years past, nitric acid has been used, combined with hydrochloric acid, in the form of a bath[2], and in this state it produces a slight excitement of the skin, a peculiar taste in the mouth, and, in other respects, nearly the same effect as when it is taken internally; but the chief perceptible effect of the mixed acid is on the bowels, which it keeps moderately open. Diluted nitric acid (*Aquafortis*) has often been employed as a poison. It is detected by the orange-coloured spots which are observed on the lips, chin, and hands of the patients; and, if death be the result, by the same colour being found in a large portion of the alimentary canal, the mucous membrane of which is converted into a fatty substance, and the stomach often perforated. If any of the fluid can be obtained, the extrication of orange-coloured fumes on boiling it over copper filings is a test of the presence of aquafortis. A good test also is a solution of indigo in sulphuric acid added to the suspected acid, until a perceptible blue is communicated. A drop of sulphuric acid is then to be added, and the mixture heated to ebullition. If the colour disappear, nitric acid is present. But the best test is the protosulphate of iron, which is rapidly converted into the sulphate of the peroxide, and the colour of the solution deepened to a dark olive-green. Soap and calcined magnesia, suspended in water, are the best antidotes.

The dose of the diluted acid is from ♏ x. to ♏ xxx. in f ℥ iij. of water, given three or four times a day. When used as a bath, the mixed acid should be added to the water, until it is about as sour

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[1] Blood drawn from the arm, after the daily use of this acid for some weeks, exhibits the buffy coat.

[2] The proportions are two parts of hydrochloric acid and one of nitric, so diluted with water as to taste as sour as vinegar. Experience has not justified the high encomiums bestowed upon it.

as weak vinegar. Nitric acid, even when diluted, is incompatible in prescriptions with oxides, earths, alkalies, and the sulphurets, also the acetates of potassa and of lead. It decomposes the two last-named salts, and forms nitates of lead and of potassa.

ACIDUM NITRO-MURIATICUM, Dub. *Nitro-muriatic Acid, Nitro-hydrochloric Acid, Aqua Regia.*[1]

"Take of pure nitric acid, *one fluid ounce;* pure muriatic acid, *two fluid ounces.* Mix in a green glass bottle furnished with an accurately ground stopper and keep in a cool place."

Syn. Acide hydro-chloro-nitrique; Eau régale (*F.*), Königswasser (*G.*), Acqua regia (*I.*).

This mixed acid exhales the odour of chlorine: it is of a golden-yellow colour, and has the property of dissolving gold and platinum: and evolving binoxide of nitrogen when copper filings are placed in it. On heating the mixture the colour deepens, and both chlorine and nitrous acid vapours are evolved. If the heat be long continued, the chlorine ceases to be given off, and the mixture no longer acts as a solvent of gold. It is probable that at first both acids are partially decomposed. And according to Gay Lussac, some compounds of nitric acid and chlorine are formed, having the formula N O_2, $Cl._2$ and N O_2, Cl. together with free *chlorine*, which last is the active agent of the mixture.

Medical properties and uses. — This mixed acid, when undiluted, is a powerful corrosive poison; but when properly diluted, it exerts a tonic and stimulant influence on the habit. It is, however, chiefly used in the form of a foot-bath in hepatic affections, and in deficient secretion of bile. The best proportions for this bath are f ℥ ij. of the mixed acid for each gallon of water. It produces a tingling sensation on the skin; and, augmenting the flow of the bile, it operates as a mild purgative on the bowels. Dr. Lendrick extols it as a general bath in syphilis and hepatic affections.[2]

When taken internally, in an over-dose, this acid excites violent inflammation, and corrodes the coats of the stomach. Its effects are most successfully counteracted by magnesia, albumen, and milk. Dose ♏ ij. to ♏ v., much diluted.

ACIDUM PHOSPHORICUM DILUTUM, Lond. *Diluted Phosphoric Acid.*

Syn. Acide Phosphorique (*F.*), Phosphorsäure (*G.*), Phosphornaia kislota Acido Fosforico (*I.*).

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[1] Under this name it was known by the ancients. The Arabians most probably knew it, as they were in possession of a solvent of gold.

[2] *Brit. and Foreign Med. Rev.* iv. 254.

"Take of phosphorus, *six drachms;* nitric acid, *four fluid ounces;* distilled water, *eight fluid ounces.* Add the phosphorus to the nitric acid, mixed with water, in a glass retort placed in a sand-bath; then apply heat until six fluid ounces have distilled. Put these again into the retort, that six fluid ounces may distil, which are to be rejected. Evaporate the remaining fluid in a platinum capsule until it is reduced to two ounces. Lastly, to the acid, when it is cold, add as much distilled water as may be sufficient to make it accurately measure a pint, and mix."

In this process the nitric acid is decomposed by the affinity of the phosphorus for oxygen being greater than that of the nitrogen. The necessity of diluting the acid is obvious; for when phosphorus is added to strong nitric acid, rapid combustion, attended with explosion, takes place; whereas in the diluted acid the phosphorus slowly abstracts the oxygen, is formed into the acid, and binoxide of nitrogen is evolved. The repetition of the process is necessary to secure the acidification of the whole of the phosphorus: but even then a minute portion of it remains unacted upon.[1]

Qualities. — Phosphoric acid obtained according to the above process is colourless, inodorous, and has a sharp acid taste; but it does not act on animal matter, like sulphuric and nitric acids. It contains 8·7 per cent. of phosphoric acid. It forms permanent salts with alkalies and metallic oxides. When evaporated to dryness, and heated to redness, it forms metaphosphoric acid. The anhydrous acid consists of 1 eq. of phosphorus + 5 eq. of oxygen. There are three modifications of phosphoric acid, called metaphosphoric, pyrophosphoric, and phosphoric; in the first condition it requires 1 eq. of base to 1 eq. of acid, in the second form 2, and in the third 3 eqs. of base; hence the different modifications are named monobasic, bibasic, and tribasic phosphoric acids; the ordinary medicinal acid is tribasic. Phosphoric acid forms insoluble precipitates with lime-water and the chloride of callium; baryta, magnesia, the salts of lead, and nitrate of silver; hence these substances are incompatible in prescriptions with it. The London College gives the following as the character of the Pharmacopœia acid:

"Free from colour and smell. Its specific gravity is 1·064. Chloride of barium, or nitrate of silver, being added, nothing is thrown down. It has no influence upon strips of copper or silver, nor is it coloured either before or afterwards when hydrosulphuric acid is added. A fluid ounce of this acid is saturated by 132 grains of crystals of carbonate of soda."

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[1] A cheaper mode of procuring it is to convert the earth of bones into acidulous phosphate of lime by means of sulphuric acid; to dissolve this out by water, and decompose the solution by carbonate of ammonia; concentrating the filtered fluid, and expelling the ammonia of the phosphate by heat.

Medical properties and uses. — Diluted phosphoric acid possesses tonic properties, and may be beneficially administered in all cases in which the mineral acids are used: but it possesses no advantages over them. Its operation resembles that of the sulphuric acid. It is indicated in cases in which the phosphates are deposited from the urine, and in exostosis and other bony tumours. The dose is from ♏ x. to ♏ xxx., in water or any bland fluid. As a topical application it may be diluted with eight times its bulk of water.

ACIDUM SULPHURICUM PURUM, Edin. Dub. *Pure Sulphuric Acid.*

"If commercial sulphuric acid contain nitrous acid, heat *eight fluid ounces* of it with between *ten* and *fifteen grains* of sugar, at a temperature not quite sufficient to boil the acid, till the dark colour at first produced shall have nearly or altogether disappeared. This process removes nitrous acid. Other impurities may be removed by distillation; which, on the small scale, is easily managed by boiling the acid with a few platinum chips in a glass retort by means of a sand-bath, or gas-flame, rejecting the first half ounce."

Dublin.

"Take of oil of vitriol of commerce, any convenient quantity. Introduce it into a small plain retort, containing a few slips of platinum foil, and passing the beak of the retort into a Florence flask, which is to be used as a receiver, with the aid of a small charcoal fire or gas lamp, distil over one-tenth of the acid. This being rejected, and a fresh receiver of the same kind connected with the retort, let the distillation be resumed, and continued until no more than about an ounce of liquid remains behind. The distilled product should now be transferred to and preserved in a well-stopped bottle. The specific gravity of this acid is 1846."

Those operations are seldom requisite for the purposes of medicine. Sulphuric acid, except for pharmaceutical purposes, is always employed in its diluted state; and the addition of the water requisite throws down any sulphate of potassa, or of lead, which the strong acid may contain. If it be filtered, and boiled to expel the water, a very pure acid is procured.

ACIDUM SULPHURICUM DILUTUM, Lond. Edin. Dub. *Diluted Sulphuric Acid.*

"Take of sulphuric acid *fifteen fluid drachms;* distilled water, *a pint.* Add the acid gradually to half a pint of the water; then pour in sufficient of the remaining water to fill accurately

the measure of pint, and mix. The specific gravity is 1·103, and a fluid ounce of this acid is saturated by 216 grains of crystals of carbonate of soda."

Edinburgh.

"Mix together *one fluid ounce* of sulphuric acid, and *thirteen fluid ounces* of water. The density of this preparation is about 1090."

Dublin.

"Take of pure sulphuric acid, *one fluid ounce;* distilled water, *thirteen ounces.* Mix. The specific gravity of this acid is 1084."

Syn. Acidum Vitriolicum dilutum, P. L. 1787. Acide Sulphurique étendu d'eau (*F.*), Verdüunte Schwefelsäure (*G.*), Verduuntes Zwavelzuur (*Dutch*), Acido solforico diluito (*I.*), Zakab (*Arab.*).

The dilute acid of the London College contains about 15 per cent. of the strong acid; the acids of the Edinburgh and Dublin Colleges about 13 per cent.

Owing to the great affinity of sulphuric acid for water, and the density of the mixture being much greater than the mean of the separated acid and water[1], a very considerable increase of temperature is produced during their combination, sufficient to crack the glass vessels in which it is made, if the two ingredients be at once mixed together.[2] To prevent such an accident, the acid must be gradually added in small portions to the whole of the water, and the mixture agitated after every addition. It is of importance always to ascertin the specific gravity of the acid before the mixture be made. The mixture, when it has cooled down to the temperature of the atmosphere, lets fall a white precipitate, consisting of a small portion of sulphate of lead, which the strong acid, unless previously purified, always contains, but which the diluted acid is incapable of holding in solu tion. The diluted acid is thus purer than the strong acid, which suffers no other alteration by the dilution except in point of strength. If it be suspected to contain sulphate of potassa, this may be detected by saturating a given quantity of the acid with ammonia, then evaporating to dryness, and afterwards expelling the sulphate of ammonia by heat; the sulphate of potassa will be left behind.

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[1] It is a curious fact that, after the mixture has cooled down to the temperature of the atmosphere, a considerable time elapses before it acquires its real density.

[2] If one part by weight of sulphuric acid of 1·845 specific gravity be mixed with one fourth its weight of water, both being at the temperature of 50° Fahr., the caloric instantly evolved is sufficient to raise the thermometer from 50° to 300°, and a still greater heat is produced by mixing 73 parts of the acid with 27 of water.

Medical properties and uses. — Diluted sulphuric acid is tonic, antiseptic, and refrigerant. Its tonic and antiseptic powers render it extremely serviceable in low typhoid fevers, dyspeptic affections, diabetes, convalescences, and in cutaneous eruptions. It restrains the colliquative sweats which attend hectic: locally applied, it is a common and useful adjunct to gargles in cynanche, and to check salivation; and as a refrigerant it is given with certain benefit in passive hæmorrhages, from whatever part they may arise. It may be regarded as a specific in scabies, when carried to a large dose. Combined with mucilages, it has been beneficially given in passive diarrhœas, operating on the relaxed mucous coat of the intestine as an astringent. In the first-mentioned cases, the diluted acid may be combined with infusions of Cinchona or other vegetable bitters and aromatics; and in the latter with infusion of Roses, mucilage, or simple water sweetened with syrup. It is certainly injurious to the teeth; and, therefore, should be sucked through a quill, when taken as an internal remedy. The usual dose is from ♏ x. to ♏ xxx., but this dose may be very often repeated: in malignant erysipelas, with a tendency to hæmorrhage, it has been given to the amount of f ℥ j. in twenty-four hours; and we have administered it, with evident advantage, to the same amount, in violent uterine hæmorrhages, and in obstinate scabies.

ACIDUM SULPHURICUM AROMATICUM, Edin. Dub. *Aromatic Sulphuric Acid.*

"Take of sulphuric acid (commercial) *three fluid ounces and a half;* rectified spirit, *one pint and a half;* cinnamon, in moderately fine powder, *one ounce and a half;* ginger, in moderately fine powder, *one ounce;* add the acid gradually to the spirit; let the mixture digest at a very gentle heat for three days in a closed vessel; mix the powders, moisten them with a little of the acid spirit, let the mass rest for twelve hours, and then put it into a percolater, and transmit the rest of the acid spirit. This preparation may be also made by digesting the powders for six days in the acid spirit, and then straining the liquor."

Dublin.

"Take of rectified spirit, *one pint and a half;* pure sulphuric acid, *three and a half fluid ounces;* cinnamon, bruised, *one ounce and a half;* ginger, bruised, *one ounce.* Upon the spirit, placed in a stoppered bottle, pour the acid gradually, and shake, so as to produce a uniform mixture. Then add the cinnamon and ginger, and macerate for a week, with occasional agitation. Lastly, filter through paper, and preserve in a well-stopped bottle. The specific gravity of this preparation is 974."

This preparation is generally regarded as an imperfect ether; but we are of opinion that the reciprocal action of the acid and alcohol during the digestion is scarcely sufficient to produce such a result; and the acid, undoubtedly, very much predominates. It is probably a simple alcoholic solution of sulphuric acid, holding the volatile oils of cinnamon and of ginger in solution.

Qualities.—The odour is peculiar and aromatic; the taste gratefully acid. It is limpid, and of a brownish colour.

Medical properties and uses.—This is an agreeable mode of exhibiting sulphuric acid in dyspepsia, chronic asthma, and most of the complaints for which the diluted acid has been found serviceable. The dose is from ♏ x. to ♏ xxx., in any convenient fluid vehicle; and this dose may be given three or four times a day; and it should be sucked through a quill.

ACIDUM TANNICUM, Dub. *Tannin or Tannic Acid.*

"Take of galls in tolerably fine powder, *eight ounces;* sulphuric ether, *three pints;* distilled water, *five ounces.* Incorporate the water and ether by agitation, and pour the resulting solution, in successive portions, upon the galls, previously introduced into a glass or porcelain percolater. The liquid which accumulates in the lower bottle will consist of two distinct strata; the heavier of which is to be separated and evaporated to dryness, finally applying an oven heat, which, however, should not exceed 212° Fah. From the lighter liquid the ether may be recovered by distilling it by means of a water-bath and with the aid of a Liebig's condenser."

Galls contain a very large amount of tannin or tannic acid, and when acted upon, as in the above process, with ether containing water, this is dissolved, along with small quantities of gallic and ellagic acids, colouring matter, &c. When the fluid which passes through the percolater is allowed to stand, it separates into two distinct layers; the upper or ethereal layer contains the gallic acid, colouring matters, &c., and the under layer consists of a concentrated watery solution of tannic acid, almost colourless and pure, which, being separated carefully and evaporated, yields the tannic acid.

Qualities.—Tannic acid is not crystalline, but occurs as a yellowish porous mass, very friable and easily reduced to powder. It is very soluble in water, less so in alcohol, and scarcely at all in ether. The watery solution has an acid reaction, very astringent taste, and forms precipitates with excess of mineral acids. Tannic acid precipitates gelatine from its solutions, also combines with gelatine-yielding tissues, forming what is called Tanno-gelatine, the basis of leather: it also precipitates albumen, all the vegeto-alkaloids, and the salts of lead, lime, &c. With the persalts of iron a bluish

black precipitate is formed, but no change is effected with the proto-salts. When precipitated with sulphuric acid, and the precipitate heated to the boiling point, tannic acid is converted into gallic acid. The composition of tannin is rather doubtful. Some consider it a tribasic acid, and gives as its formula $C_{18}H_5O_9 + 3HO$. Mulder is inclined to regard it as isomeric with gallic acid, and gives the following formula as representing its composition, $C_{28}H_9O_{17} + HO$.

Medical properties and uses. — Tannic acid possesses, in an exalted degree, all the astringent properties of the nut-galls and astringent barks and roots. Its topical action is more powerful than that of gallic acid, but when absorbed, it appears to undergo decomposition, and in the urine is found as gallic and pyrogallic acids, and a humus-like body. It also acts as a powerful remote astringent; but the editor, from considerable experience of the comparative action of tannic and gallic acids in the treatment of hæmorrhages, is inclined to regard is as less powerful than gallic acid. It may be employed either externally or internally. Externally, as a topical astringent in the form of ointment, injection, or gargle; as an application to piles, to check discharges, and to diminish relaxation of parts. Internally, it may be given for its astringent effects on the alimentary mucous membranes, as to check hæmorrhage from the stomach and intestines, to act as a constipating agent in relieving diarrhœa, as a tonic in some forms of dyspepsia, and as a remote astringent it may be used in the same cases as gallic acid.

Dose, grs. iij. to grs. x., or more, in pills or solution.

As a gargle or injection, grs. v. to grs. x. to the fluid ounce.

As an ointment ʒss to ʒj. to an ounce of lard; it should be first rubbed up with a little water, and then with the lard.

ACIDUM TARTARICUM. Edin. *Tartaric Acid.* Contained in the list of Materia Medica of the London and Dublin Colleges.

"Take of bitartrate of potassa, *four pounds;* boiling distilled water, *two gallons and a half;* prepared chalk, *twenty-five ounces and six drachms;* diluted sulphuric acid, *ten pints and seven fluid ounces;* muriatic acid, *twenty-six fluid ounces and a half, or a sufficiency.* Boil the bitartrate with two gallons of the water, and gradually add half the prepared chalk, constantly stirring; when the effervescence is over, add a solution obtained by dissolving the rest of the chalk in the muriatic acid; after the tartrate of lime has subsided, pour off the liquid, and wash the tartrate with distilled water, until it is tasteless. Then pour the diluted sulphuric acid on the tartrate, and boil for fifteen minutes. Evaporate with a

gentle heat, to obtain crystals. Purify these by repeated solutions, filtration, and crystallization."

In this process, which is nearly the same which Scheele employed in 1769, the lime of the chalk separates the excess of tartaric acid from the potassa with which it was previously combined; and again yields it up, in order to combine with the sulphuric acid, which is used in the second part of the process. The use of the muriatic acid is to form with the chalk a muriate of lime, or, more properly, a chloride of calcium, which decomposes the tartrate of potassa, so that the whole of the tartaric acid is thus procured. Before crystallizing, it is proper to test the liquor by dropping a little acetate of baryta into a small portion of it, which throws down a precipitate insoluble in nitric acid, if any sulphuric acid be present; in which case a little more tartrate of lime should be added. The crystals are obtained in groups, and cannot be always procured of the same form under the most careful management. In order to obtain perfectly colourless crystals, the solution should be boiled with animal charcoal. The process is not adapted for operations on a small scale, as much better tartaric acid can be purchased at a moderate price, prepared in the large way.

Qualities. — Tartaric acid in its crystallized state is white, imperfectly transparent, persistent in the air, inodorous, and very acid to the taste. The form of its crystal is an oblique rhombic prism, more or less modified. It melts when heated a little above above 212°, and boils at 250°. Tartaric acid is readily soluble in water, which dissolves one-fifth of its weight, at 60° Fah., and twice its weight at 212°; and the saturated solution is less liable to spontaneous decomposition than a weak solution. It is partially soluble in alcohol. It is decomposed by a high temperature, and also by sulphuric and nitric acids, the latter of which converts it into oxalic acid. It combines with alkalies, earths, and metallic oxides, forming *tartrates.* It is a bibasic acid, or requires two equivalents of base to neutralise it. When one of these equivalents is water, salts called acid tartrates or bitartrates are formed; again, from the same cause, it readily forms double salts, where the two equivalents of base are different; some of these are used in medicine, as the tartrate of potash and soda (Rochelle salts), and the tartrate of potash and antimony, &c. The acid as it exists in the salts has the formula, $C_8\,H_4\,O_{10}$. That of tartaric acid, or tartrate of water, is $C_8\,H_4\,O_{10} + 2\,HO$.

When carelessly prepared, it may contain sulphuric acid, which, however, can be detected by adding chloride of barium to a weak solution, when a precipitate insoluble in an excess of nitric acid will be thrown down, if sulphuric acid be present. It more frequently contains lime, which is readily detected by the Edinburgh test, namely, incinerating the salt with red oxide of mercury: if lime be present, it is left in the form of a carbonate.

The London College gives the following characters for tartaric acid: — "Free from colour; totally or almost entirely destroyed by heat; soluble in water; the solution precipitates bitartrate of potash from any neutral salt of potash. Chloride of barium gives no precipitate, and the precipitate formed with acetate of lead is dissolved by nitric acid. One hundred grains of this acid are saturated by 192 grains of the crystals of carbonate of soda."

Medical properties and uses. — Tartaric acid, largely diluted and sweetened, forms an agreeable refrigerant beverage in fevers, and diseases connected with an increased secretion of bile. It seems to act also on the kidneys, increasing the urinary secretion, but with less energy than the bitartrate. It is incompatible in prescriptions with solutions of salts containing potassa, as it converts the potassa into a bitartrate, which falls down in minute crystals. It also precipitates salts of lime and of lead. Dissolved in water, and added to an aqueous solution of carbonate of soda, it forms a good substitute for soda-water.

ÆTHEREA.

Preparations of Ether.[1]

CHLOROFORMYL, Lond. CHLOROFORMUM, Dub. *Chloroform.* See *Preparation of Chlorine.*

ÆTHER SULPHURICUS, Edin. Dub. *Sulphuric Æther,* placed in list of Materia Medica of London College under the name of Æther, Ether. (In 1836, called Sulphuric Ether.)

"Take of rectified spirit, *fifty fluid ounces,* sulphuric acid, *ten fluid ounces.* Pour *twelve fluid ounces* of the spirit gently over the acid contained in an open vessel, and then stir them together briskly and thoroughly; transfer the mixture immediately into a glass mattrass connected with a refrigeratory, and raise the heat quickly to about 280°. As soon as the ethereal fluid begins to distil over, supply fresh spirit through a tube into the mattrass in

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[1] Ethers are very volatile, and require to be preserved in closely-stopped phials; that proposed by Dr. Dewar is the best for this purpose. It consists of a stopped phial, having a circular rim round its shoulder, not rising quite so high as the mouth of the bottle, and a glass cup with a heavy bottom, which, when inverted over the mouth of the phial, and mercury poured into the rim, hermetically closes it. — *Annals of Phil.,* vol. x. p. 20.

a continued stream, and in such quantity as to equal that of the fluid which distils over. This is best accomplished by connecting one end of the tube with a graduated vessel containing the spirit, passing the other end through a cork fitted into the mattrass, and having a stop-cock on the tube, to regulate the discharge. When forty-two ounces have distilled over, and the whole spirit has been added, the process may be stopped. Agitate the impure ether with sixteen fluid ounces of a saturated solution of muriate of lime, containing half an ounce of lime recently slacked. When all odour of sulphurous acid is thns removed, pour off the supernatant liquor, and distil it with a very gentle heat, so long as the liquor which passes over has a density not above 735. More ether of the same strength is then to be obtained from the solution of muriate of lime. From the residuum of both distillations a weaker ether may be obtained in a small quantity, which must be rectified by distilling it gently again."

Dublin.

"Take of rectified spirit, *three pints;* oil of vitriol of commerce, *eight fluid ounces;* fresh burned lime, in fine powder, *one ounce.* Mix the acid and ten ounces of the spirit in a glass mattrass, capable of holding a quart at least, and without allowing the mixture to cool, connect the mattrass with a Liebig's condenser, and, applying a sufficient heat to maintain the liquid in brisk ebullition, commence the distillation. As it proceeds, admit gradually, through a glass tube traversing the cork of the mattrass, the remainder of the spirit, regulating its influx so that the boiling liquid shall maintain a constant level; and when the entire of it has been introduced continue the application of the heat until the contents of of the mattrass become black, and show a tendency to froth over. (The tube through which the spirit enters should dip by its lower extremity, where its diameter it contracted, at least half an inch beneath the surface of the liquid in the mattrass; and the eduction pipe of the reservoir for the spirit, with which the exterior extremity of the glass tube is connected, should be furnished with a stop-cock, to regulate the descent of the spirit. This reservoir, also, should be placed at least three feet above the level of the boiling liquid.) The crude ether thus obtained is to be agitated with the pulverised quicklime, and then rectified; the distillation being continued as long as the product, on being well shaken, continues to have a specific gravity lower than 750. The resulting liquid should be preserved in a cool place, in accurately stopped bottles. A fresh receiver being attached to the further end of the condenser, and the distillation resumed, a product will be obtained which may be substituted for rectified spirit in a subsequent ether process."

Syn. Ether (*F.*), Schwefeläther (*G.*), Eter (*I.*).

The admixture of alcohol, or rectified spirit, and sulphuric acid produces an almost instantaneous formation of ether, which is made sensible by the odour of the mixture; while, by the mutual action of the spirit and the acid on each other, a considerable evolution of caloric takes place, and the temperature of the mixture is raised to 180°. Whatever can encourage the sudden rise of temperature, and the disengagement of ethereal vapours before the apparatus be adjusted, should be avoided; for not only is the retort in danger of being broken, but a considerable waste of product also takes place. The retort should be thin, and the sand-bath previously heated to more than 200°; for unless the liquor boil immediately alcohol is given over: as soon as boiling commences the ether is formed, and distils over. The ether, as it distils, is condensed in the cool receiver, in the form of a colourless, limpid, transparent fluid; but towards the end of the operation a white vapour also comes over, on the appearance of which the distillation should be stopped, or the receiver changed. The receiver ought to be ample, and kept cool with ice or snow, or cold water, which we have found to be preferable to ice or snow. The best mode of applying it is to lay narrow shreds of woollen cloth over the receivers, with one end of each immersed in a vessel of cold water placed higher than the receiver, by which means the water is made to trickle constantly over it: and by the evaporation the receiver is kept in a sufficiently low temperature, and at the same time the nature of its contents is distinctly seen, which cannot be conveniently done when they are immersed in snow, or ice, or even in water. The luting which answers best in this operation is common paste, spread on slips of calico, which are to be first applied, and when dry surrounded with pieces of wet bladder.

By the rectification of the product, either with the fresh-burned lime or the muriate of lime and lime, it is deprived of the sulphurous acid and nearly all the water, and its specific gravity is reduced to ·750 or ·732; but it still contains some water and alcohol; for pure ether, at 60° Fah., has the specific gravity about ·720. The use of the lime in the rectification is to separate and detain the acid and the water by its affinity for these substances.

The theory of the formation of ether is still unsettled. It has been contended, that the balance of affinities between the constituents of the alcohol is broken by the acid, the oxygen of which, attracting a portion of the hydrogen of the alcohol, forms water; while a portion of its carbon, at the same time set free, forms the residuary black matter found in the retort; and, by a new combination of the remaining hydrogen, carbon, and oxygen, the ether is produced. This explanation, however, which supposes a partial decomposition of the acid, has been denied by Fourcroy and

Vauquelin, who, from a series of very ingenious experiments[1], concluded that the acid suffers no decomposition, except towards the end of the process, which is to be attributed to the carbonaceous matter collected in the retort; but that it produces the decomposition of the alcohol without being itself decomposed, by the exertion alone of a disposing affinity, abstracting water or its elements from the alcohol. Mr. Hennel found that two equivalents of sulphuric acid being added to two of alcohol, the acid undergoes great changes, and is converted into sulphovinic acid, which is a compound of sulphuric acid, and a carburet of hydrogen: and he supposes that this change is a stage in the formation of ether. It is present in greatest quantity when the materials are first mixed; but as the distillation proceeds, and the ether is formed, the sulphovinic acid diminishes in quantity, until it entirely disappears. The sulphurous and carbonic acids, and the charry residue formed in the process, are supposed by this theory to be produced by the decomposition of a portion of the alcohol by the sulphuric acid, which is set free at the end of the process. According to this theory, the same sulphuric acid should be adequate to convert any quantity of alcohol into ether, provided the spirit were supplied as the ether passes off. Gieger alleges, that "the process, when well managed, may be continued with the same acid indefinitely, and so as to produce nothing but ether and water."[2]

Professor Williamson, of University College, has recently investigated the subject of etherification, and considers that ether is produced in the following manner. When alcohol and sulphuric acid are mixed, sulphovinic acid and water are formed, by half the hydrogen of the acid being replaced by the hydrocarbon of the alcohol. The sulphovinic acid thus formed, meeting with another equivalent of alcohol, is converted into sulphuric acid and ether; and the acid then coming again in contact with more alcohol, again forms sulphovinic acid and water, and thus the process goes on continuously. Dr. Williamson considers the atom of hydrogen to be one half that usually received in this country, and also that alcohol has only half the equivalent commonly assigned to it.[3]

Qualities.—Ether has a fragrant, penetrating odour, and a hot, pungent taste. It is colourless and perfectly limpid; and is one of the most volatile of liquids, drying immediately if poured on the hand, and producing a great degree of cold by its evaporation. Its sp. gr., when it is perfectly pure, is ·720 at 60° Fah., but it is seldom procured in the shops under ·735. When it is of a density ·720 it boils in the open air at 96°, and in vacuo at 20°, a tempe-

[1] *Annales de Chimie*, xxiii. 203. [2] *Handbuch*, i. 741.

[3] For details of Dr. Williamson's views, and the arguments in favour of it, see *Quarterly Journal of the Chemical Society*, vol. iv. No. XIII.

rature 12 degrees below the common freezing point. It is extremely inflammable, taking fire on the approach of an ignited body; a circumstance which requires to be attended to in pouring it from the phial to a glass by candle-light: during its combustion, water and carbonic acid are formed. It unites with alcohol in every proportion, and also readily mixes with ammonia; but ten parts of water take up or dissolve one only of ether. It dissolves balsams, wax, volatile oils, bitumens, camphor, extractive, gum-resins, resins, sulphur in small proportions, narcotine and bichloride of mercury, but it does not dissolve the fixed alkalies.[1] Ether is generally regarded as an oxide of a radical named ethyle ($C_4 H_5$): hence its formula is $C_4 H_5 + O$. The name sulphuric ether formerly given to it by the London College, and still retained by the Edinburgh and Dublin Colleges, is erroneous, as other acids — as the phosphoric acid — can be employed in its formation.

Ether is sometimes adulterated: if it contain sulphuric acid from imperfect rectification, this may be detected by a precipitate being formed on the addition of solution of baryta; when *alcohol* is present, a milky solution is formed with phosphorus, which is not the case when it is pure. When it contains water its density detects the adulteration: or it is displayed by agitating the mixture with chloride of calcium: the ether separates and rises to the surface. It should be kept in an obscure place, for, when exposed to light, in a bottle partially filled, it absorbs oxygen, and acetic acid is generated.

According to the London College, ether is "free from colour; its sp. gr. does not exceed ·750; exposed to the air it evaporates; scarcely, if at all, reddens litmus; and half a pint of water is required to combine with a fluid ounce of it." The Edinburgh College states that it has a "density ·735, or under: when agitated in a minim measure, with half its volume of concentrated solution of muriate of lime, its volume is not lessened."

Medical properties and uses. — Ether or sulphuric ether is stimulant, narcotic, and antispasmodic. In large doses its operation resembles alcohol, but it is more diffusible, and its effects are less permanent. It is beneficially employed as a cordial in typhoid and low fevers, particularly when nausea, subsultus tendinum, and other spasmodic symptoms, are present. It pervades the whole habit; and passes off by the lungs. As an antispasmodic, it relieves the paroxysm of spasmodic asthma, whether it be taken into the stomach, or its vapour only be inhaled into the lungs; in which latter form it is also useful in simple dyspnœa and in catarrh. It is employed with advantage in hysteria, tetanus, cramp of the

[1] When *sulphuric* and *hydrochloric ethers* are mixed together in equal proportions the evaporation is very rapid, and a degree of cold considerably below 0 of Fahrenheit is produced.

stomach, hiccough, and in cholera morbus, to check the vomiting; and it also allays the violence of sea-sickness. The usual dose of sulphuric ether is from ♏ xx. to f ʒ j.; but it has been given in much larger doses with the most beneficial effects: and in all cases the dose must be repeated at short intervals to produce the full effect of the remedy. When the vapour of ether is inhaled it produces peculiar effects, similar to those caused by chloroform; it was much employed for this purpose a few years since, until its use was superseded by the last-named agent: these effects will be described under chloroform (See *Preparations of Chlorine*). As an external application, ether acts either as a stimulant or a refrigerant, according to the mode in which it is applied. The first occurs when it is prevented from evaporating, by being confined over the spot to which it is applied; in which case it often proves useful in relieving headache and other muscular pains: the second is produced by its rapid evaporation, on which account it is applied to burns, and to assist in the reduction of strangulated hernia. We have seen it produce almost immediate relief in ear ache, when dropped into the meatus externus.

Ether has the power of dissolving gun cotton, and with it forms a transparent syrupy liquid named collodium or collodion, which on evaporation leaves a transparent film, which is adhesive and contractile. It has been employed in surgery to unite the edges of wounds; to cover the surface of ulcers; and also as a protecting agent in some skin affections.

Officinal preparations. — *Spiritus Ætheris comp.* L. *Tincturæ Ergotæ Ætherea,* L. *Tincturæ Lobeliæ Ætherea,* L.

OLEUM ÆTHEREUM[1], Lond. *Ethereal Oil.*

"Take of rectified spirit, *two pints;* sulphuric acid, *thirty-six fluid ounces;* solution of potassa, and distilled water, of each *a fluid ounce,* or as much as may suffice. Mix the acid and the spirit cautiously together. Let the liquor distil until a black froth swells up; then immediately remove the retort from the fire. Separate the lighter liquor from the heavier; and expose the former to the air for a day. Add to it the solution of potassa mixed with water, and shake them together. Lastly, separate the well-washed etherial oil, which shall have subsided."

Syn. Huile douce de vin (*F.*), Oleo dolce di vino (*I.*).

The product of this process is an oily matter, of a yellow colour, of sp. gr. 1·05, less volatile than ether; soluble both in ether and alcohol, but insoluble in water. It appears to be a sulphate of ether and etherine (C_4 H_4), and its formula is C_4 H_5

[1] Oleum vini, P. L. 1787.

$O + SO_3 + C_4 H_4 + SO_3$. The oil of wine is a very small product, not more than 1 part of the oil being obtained from 75 parts of alcohol. After being kept for a few months, ethereal oil becomes viscid, and prismatic crystals form in it, which are soluble in ether and alcohol, melt at a slight heat, and sublime unaltered. In sulphuric acid they dissolve, forming a pink solution; and in nitric a deep red: but they are insoluble in hydrochloric and acetic acids, and in the alkalies. It is used only for the preparation of the compound spirit.

Officinal preparations.—*Spiritus Ætheris compositus*, L. *Spiritus Æthereus Oleosus*, D.

SPIRITUS ÆTHERIS NITRICI[1], Lond. Edin. *Spirit of Nitric Ether.*

"Take of rectified spirit, *two pints;* nitric acid, *three and a half fluid ounces.* Add the acid gradually to the spirit, and mix; then distil twenty-eight fluid ounces."

Edinburgh.

"Take of rectified spirit, *two pints and six fluid ounces;* pure nitric acid (D. 1500), *seven fluid ounces.* Put fifteen fluid ounces of the spirit, with a little clean sand, into a two-pint mattrass, fitted with a cork through which are passed a safety-tube terminating an inch above the spirit, and another tube leading to a refrigeratory. The safety-tube being filled with pure nitric acid, add through it gradually three fluid ounces and a half of the acid. When the ebullition which slowly arises is nearly over, add the rest of the acid gradually, half a fluid ounce at a time, waiting till the ebullition caused by each portion is nearly over before adding more, and cooling the refrigeratory with a stream of water, iced in summer. The ether thus distilled over being received into a bottle, it is to be agitated, first with a little milk of lime till it ceases to redden litmus paper, and then with half its volume of a concentrated solution of muriate of lime. The pure hyponitrous ether thus obtained, which should have a density of 899, is then to be mixed with the remainder of the rectified spirit, or exactly four times its volume."

Spirit of nitric ether ought not to be kept long, as it always undergoes decomposition, and becomes at length strongly acid. Its density by this process is 847.

SPIRITUS ÆTHEREUS NITROSUS, Dub. *Nitrous Ethereal Spirit.*

"Take of rectified spirit, two pints and eight fluid ounces; pure nitric acid, three fluid ounces; water, one ounce; solution of am-

[1] Spiritus nitri dulcis, P. L. 1745. Spir. ætheris nitrosi, 1787.

monia, a sufficient quantity. Place six ounces of the spirit in a glass mattrass capable of holding a quart, and connect this with a Liebig's condenser, whose further extremity is fitted closely by a collar of tow into a thin eight ounce phial. Add now the water to the nitric acid, and, having introduced half of the resulting solution into the mattrass, through a safety syphon-tube, close the mouth of this tube with a cork, and apply for a few moments to a gentle heat, so as to cause a commencement of ebullition. When the *action* (which shortly after commencing, proceeds with much violence, and should be moderated by the external application of cold water) has relaxed, introduce gradually the remainder of the acid, so as to restore it. The action having entirely ceased, agitate the distilled product with half its bulk of solution of ammonia, allow the mixture to rest for a few minutes, and, having separated the supernatant ethereal liquid, mix four ounces of it with the rest of the spirit, and preserve the product in small strong and accurately stopped bottles. In the performance of the preceding distillation the condenser should be fed with ice cold water, and the phial, in which the distilled liquid is received, should be surrounded by a mixture of one part salt and two of pounded ice; or, when ice cannot be procured, with a mixture of eight parts of sulphate of soda in small crystals and five of commercial muriatic acid."

Syn. Alcohol éthéreux par l'acide nitrique (*F.*), Atherischer saltpeter spiritus (*G.*). Spirito di nitro dolce (*I.*).

When alcohol and nitric acid in the proportions above given are subjected to heat not above 212° Fahr., they react upon each other, and there are formed several compounds, amongst which are hyponitrite of oxide of ethyle or hyponitrous ether, aldehyde, &c., which distil over with excess of spirit. The Edinburgh and Dublin colleges order the free acid which it always contains to be neutralized, the former by means of lime, the latter by agitation with solution of ammonia: the London college orders no such neutralization: it will also be observed that the London process differs from the other two in this respect,—namely, that the whole of the spirit is mixed with the nitric acid and distilled, so that the ether and a large excess of alcohol came over together; whereas in the Edinburgh and Dublin processes, a tolerably concentrated ether is first formed, which is afterwards united with the remainder of the spirit.

Qualities.— Spirit of nitric ether has an extremely fragrant odour, and a pungent, acidulous taste. It is very volatile and inflammable; and boils at about 160° Fahr. It should not redden litmus when it is newly made; but after a time it reddens that re-agent, acetic and other acids being slowly formed. It is soluble in forty-eight parts of water, and in a smaller quantity of alcohol. The alkalies decompose it, and nitrites and acetates are formed.

It coagulates tincture of guaiacum, giving it at the same time a deep-blue colour; and it also strikes a deep olive with solution of green sulphate of iron.[1] The London college gives the following as the characters of this preparation. "Its sp. gr. is ·834. It very slightly reddens litmus, and does not effervesce when carbonate of soda is added."

Hyponitrite of oxide of ethyle, hyponitrous ether, when pure, occurs as a pale-yellow liquid, very volatile, having a strong and agreeable odour, not unlike that of apples; sp. gr. ·947, and a boiling point as low as 62° Fahr. When heated with potash it is decomposed into a hyponitrite of that base and alcohol. It is sparingly soluble in water, but soluble in all proportions in alcohol, very inflammable, burning with a white flame without leaving any residue. The composition of the hyponitrite of oxide of ethyle is represented by the formula $C_4 H_5 O + N O_3$. The pharmacopœial spirits of nitric ether consist of alcohol, containing the above ether in undetermined proportions, together with small amounts of aldehyde ($C_4 H_3 O$), acetic acid ($C_4 H_3 O_3 + H O$), &c.

Medical properties and uses. — Spirit of nitric ether is refrigerant, diuretic, and antispasmodic. It has long been employed under the title of *Sweet Spirit of Nitre,* as a grateful refrigerant, and to quench thirst in febrile affections; for which purpose the dose is from ♏ xx. to ♏ xl., given in a cupful of water, or any other appropriate vehicle. In larger doses, it acts as a gentle stimulant to the stomach, relieving nausea and flatulence; and also determines to the kidneys, increasing the flow of urine; on which account it is advantageously prescribed as an auxiliary to other diuretics in dropsical complaints. The usual dose may be given in water.

SPIRITUS ÆTHERIS SULPHURICI, Edin. *Spirit of Sulphuric Ether.*

"Take of sulphuric ether, *a pint;* rectified spirit, *two pints:* mix them." The density of this preparation ought to be 809.

Medical properties and uses. — It may be used for the same purposes as the ether; but it is necessarily much less active. It has, however, the advantage of mixing readily with water. The dose is from f ʒ ss. to f ʒ iij. A useful gargle for slight inflammation of the fauces is prepared by adding f ʒ j. of this spirit to f ℥ vj. of barley-water, sweetened with f ʒ iv. of syrup of marshmallows.

Officinal preparation.— *Tinctura Lobeliæ Œtherea,* E.

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[1] Dr. Paris says that this ethereal spirit, when added in a small proportion to malt spirits, communicates to them a flavour resembling that of French brandy. — *Pharmacologia.*

SPIRITUS ÆTHERIS COMPOSITUS, Lond. *Compound Spirit of Æther.*

"Take of ether, *eight fluid ounces;* rectified spirit, *sixteen fluid ounces;* ethereal oil, *three fluid drachms.* Mix them."

SPIRITUS ÆTHEREUS OLEOSUS, Dub. *Oily Ethereal Spirit.*

"Take of rectified spirit, *one pint and a half;* oil of vitriol of commerce, *one pint and a half;* sulphuric ether, *five fluid ounces.* Mix the oil of vitriol with one pint of the rectified spirit, in a mattrass of glass, and, connecting this with a Liebig's condenser, apply heat, and distil, till a black froth begins to rise. Separate the uppermost or lighter stratum of the distilled liquid, and, having exposed it in a capsule for twenty-four hours to the atmosphere, let the residual oil be transferred to a moist paper filter, and washed with a little cold water, so as to remove any adhering acid. Let it now be introduced into a bottle containing the remainder of the spirit, mixed with the ether, and dissolved."

In the London process the ethereal oil, prepared as directed by a separate process, and ether, are ordered to be mixed with the rectified spirit; but in the Dublin process, the method of making the oil is first given, which is afterwards to be added to the ether and rectified spirit. The products are very similar to each other.

Syn, Alcohol éthéreux par l'acide sulphurique (*F.*), Atherischer Schwefelgeist Liquor (*G.*), Anodino minerale dell' Hoffmann (*I.*).

This is intended as a substitute for the *anodyne liquor of Hoffmann;* and, besides being stimulant and antispasmodic, it is supposed to possess anodyne properties. It is a useful addition to tincture of opium, when given with the intention of procuring sleep; and often prevents the opium from exciting the nausea, which it is apt to produce in some habits. The dose is from f ʒ ss. to f ʒ ij. in any appropriate vehicle.

ALKALINA.

ALKALOIDS, AMMONIA, AND THEIR SALTS.

I. *AMMONIA AND AMMONIACAL SALTS.*

AQUA AMMONIÆ ET AQUA AMMONIÆ FORTIOR, Edin. AMMONIÆ LIQUOR, Dub. *Water of Ammonia, Solution of Ammonia.*

" Take of muriate of ammonia, *thirteen ounces;* quick lime, *thirteen ounces;* water, *seven fluid ounces* and *a half;* distilled water, *twelve fluid ounces.* Slake the lime with the water, cover it up until it cools; triturate it well and quickly with the muriate of ammonia previously in fine powder, and put the mixture into a glass retort, to which is attached a receiver with a safety tube. Connect with the receiver a bottle, also provided with a safety tube, and containing four ounces of the distilled water; but capable of holding twice as much. Connect this bottle with another loosely corked, and containing the remaining eight ounces of distilled water. The communicating tubes must descend to the bottom of the bottles at the further end from the retort: and the receiver and bottles must be kept cool by snow, ice, or a running stream of very cold water. Apply to the retort a gradually-increased heat till gas ceases to be evolved; remove the retort, cork up the aperture in the receiver where it was connected with the retort, and apply to the receiver a gentle and gradually-increased heat, to drive over as much of the gas in the liquid contained in it, but as little of the water, as possible. Should the liquid in the last bottle not have the density of 960, reduce it with some of the Stronger Aqua Ammoniæ in the first bottle, or raise it with distilled water, so as to form aqua ammoniæ of the prescribed density.

Dublin.

" Take of sal-ammoniac, in fine powder; fresh burned lime, of each eight ounces; water, four ounces; distilled water, sixteen ounces. Pour on the lime the four ounces of water, and when the slaked lime has cooled, mix it well with the sal-ammoniac by trituration in a mortar. Introduce the mixture into a mattrass of glass, or if such can be had, an iron bottle, and having closed this by means of a cork, perforated by a suitable tube for conveying off the gas, apply, with the intervention of sand, a gentle heat, which must be gradually augmented, and cause the ammonia, as it is evolved, to pass first through a small Wolfe's bottle furnished with a syphon safety tube containing mercury, and thence to the bottom of a pint bottle containing the distilled water. The temperature

of the latter must be prevented from rising as the absorption of the gas proceeds, by surrounding the bottle which contains it with cold water, which should be frequently renewed. The specific gravity of this solution is 950."

AMMONIÆ LIQUOR FORTIOR, Dub.

"Apply heat to a mixture of sal-ammoniac and slaked lime, using the proportions given in the preceding formula, and cause the gas, as it is disengaged, to pass to the bottom of a bottle containing eight ounces of *ammonia liquor;* the temperature of the latter being prevented from rising by surrounding it with cold water, which should be frequently renewed."

Or,

"Pass the ammoniacal gas disengaged from eight ounces of sal-ammoniac in five ounces of distilled water, taking care to keep the receiver cool. The specific gravity of this solution is 900."

Syn. Dissolution d'ammoniaque (*F.*), Atzender Ammonium-liquor (*G.*), Vlugtiger etzender Salamoniak geest (*Dutch*), Liquore di Ammoniaco (*I.*).

In these processes, the calcium of the lime having a powerful affinity for the chlorine of the hydrochloric acid, the hydrochlorate is decomposed, and the ammonia disengaged, and carried over in combination with the watery vapour. If the temperature of the water rise to 130°, the ammonia is again separated in the form of gas; and hence the necessity of keeping the receivers cold; but water at 60° takes up 780 times its bulk of gaseous ammonia: which increases the bulk of the liquid two thirds. The product thus obtained is an aqueous solution of ammonia; whilst chloride of calcium remains in the retort, and may be dissolved out by twice its weight of water. The hydrogen of the hydrochloric acid combines with the oxygen of the lime and forms water. The best proportions for extricating the ammonia are equal parts of hydrochlorate of ammonia and of lime, which are now ordered by Edinburgh and Dublin Colleges. A solution of sp. gr. 0·960 is obtained by adding *two* fluid ounces of water to one fluid ounce of liq. ammoniæ fortior of commerce.

Qualities. — Liquid ammonia is a limpid, colourless fluid. It has a strong, overpowering pungent odour, giving off alkaline vapours, which brown turmeric, and restores the colour of reddened litmus papers; an extremely acrid taste, and corrodes the skin. Obtained according to the Edinburgh process for aqua ammoniæ fortior, its specific gravity is about 0·880; while that of the Dublin College is 0·900. The following table shows the strength of liquid ammonia of different degrees of specific gravity within a certain range (temp. 50° Fahr., pressure 29·8 barom.): —

100 Parts Sp. Grav.	Contain of		100 Parts Sp. Grav.	Contain of	
	Ammonia.	Water.		Ammonia.	Water.
·9000	26·00	74·00	·9513	12·40	87·60
·9054	25·37	74·63	·9545	11·56	88·44
·9166	22·07	77·93	·9573	10·82	89·18
·9255	19·54	80·46	·9597	10·17	89·83
·9326	17·52	82·48	·9619	9·60	90·40
·9335	15·88	84·12	·9684	9·50	90·50
·9435	14·53	85·47	·9639	9·09	90·91
·9476	13·46	86·54	·9713	7·17	92·83[1]

But Mr. Phillips says that the liquid ammonia of the London College, of sp. gr. 0·960, is a compound of ammoniacal gas 10, water 90 parts, in 100.[2] For ordinary purposes it is useful to know that a phial capable of containing 224 grains of distilled water, can hold no more than 216 grains of the strong solution.

Liquid ammonia assists the oxidizement of copper and of zinc; dissolves many of the metallic oxides; and unites with all the acids without effervescence, forming neutral salts. It dissolves oils, resins, and many other vegetable principles. Its affinity for carbonic acid is so powerful, that it rapidly attracts it from the atmosphere. The acids, the metallic salts, and alum, are incompatible in formulæ with it. The constituents of ammoniacal gas are by measure, 3 volumes of hydrogen and 1 of nitrogen condensed into 2 volumes; or by weight, 3 parts of hydrogen, and 14 parts of nitrogen; or in equivalents, 3 eq. of hydrogen, and 1 eq. of nitrogen. Formula NH_3.

The presence of carbonic acid in solution of ammonia may be readily detected by its effervescing with acids, and by adding to it chloride of calcium, or lime water, which form a precipitate if carbonic acid be present. If hydrochloric acid be present it is readily detected by nitrate of silver, after neutralizing the solution with nitric acid; oxalic acid detects lime, and sesquicarbonate of ammonia other earthy salts. Hydrosulphuric acid does not colour unless metallic matters are present.

Medical properties and uses. — This solution of ammonia is stimulant, antacid, sudorific, and rubefacient. It is usefully employed, when largely diluted, in paralysis, hysteria, and syncope[3]: and is, perhaps, superior to all the other antacids in relieving car-

[1] *Davy's Researches*, p. 68. [2] *Trans. of Pharm.*

[3] Fatal cases have occurred from its too free employment in syncope: inflammation has been set up in the mucous membrane: and asphyxia produced by the overabundant secretion of mucus.

dialgia and other symptoms of acidity of the stomach. As a local stimulant it is applied to the nostrils in faintings; but much caution is requisite in such cases, as inflammation may be set up in the mucous membrane. When diluted with ten or twelve parts of water, the vapour may be advantageously inhaled in chronic asthma, in chronic hoarseness, and in cases of constriction of the chest when no inflammation is present. This vapour is also useful when bromine has been accidentally inhaled, and has produced poisonous effects. As a topical excitant also, a rag moistened with the solution and laid over the scrobiculus cordis, sometimes raises an instantaneous blister, and, by quickly inflaming the skin, proves useful in spasms and gout in the stomach. Combined with a small portion of oil, it forms a saponaceous rubefacient, which is beneficially applied to the throat in inflammatory sore throat, in which case it operates not only as a rubefacient, but excites diaphoresis. Its influence as a counter-irritant, when combined with soap liniment, as a friction in deep-seated inflammation and rheumatism, is well ascertained. The dose of the solution is from ♏ v. to ♏ xx. in a large cupful of cold water or milk. When it has been taken as a poison, if death be not the immediate result, the best antidote is vinegar.

AMMONIÆ CARBONAS, Edin. *Carbonate of Ammonia;* called AMMONIÆ SESQUICARBONAS in the London and Dublin lists of Materia Medica.

"Take of sal ammoniac, one pound; chalk, one pound and a half. Reduce them separately to fine powder; mix them thoroughly, and subject the mixture in a retort, with a proper receiver, to a gradually increasing heat so long as any vapours sublime."

Syn. Carbonate d'ammoniaque (*F.*), Kohlensaures ammoniak (*G.*), Drooges kohlenzuures ammonium (*Dutch*), Uglekirloi ammiac (*Russ.*), Sottocarbonato di ammoniaco (*I.*), Wavachara acranum (*Tam.*).

This salt is produced by a double decomposition of the substances employed. The chloride of lime which is formed remains in the retort, while the carbonate of ammonia sublimes, and concretes into a cake on the sides of the receiver. The chalk should be extremely well dried, and the ingredients very intimately mixed, that the decomposition may be as complete as possible. The retort should have a wide cylindrical neck; and the receiver have a nearly cylindrical form, to permit the concreted salt to be taken out without breaking the glass.[1] The quantity of carbonate of

[1] This salt is prepared on a large scale, by mixing four parts of purified sulphate of ammonia, and one part of chalk, in fine powder, and submitting it to sublimation in an iron pot, to which the heat is directly applied, and which is connected with a large earthen or leaden receiver. This receiver is fitted with a leaden cover secured by a

lime ordered is greater than absolutely necessary, an equal part only being requisite, or one equivalent of the carbonate of lime being sufficient to decompose one equivalent of the hydrochlorate of ammonia.

Qualities. — Sesquicarbonate of ammonia has a penetrating, pungent odour, an acrid, penetrating taste, and a powerful alkaline reaction. It is usually in white, semitransparent, crystalline, hard cakes, which break with a striated fracture. It has the specific gravity of 0·966[1]; and is totally volatilized, when pure, in a moderate heat. It is soluble in less than two parts of water at 60°, and in an equal weight of tepid water, and is decomposed in water at 212°. It is soluble in proof spirit, but nearly insoluble in alcohol, which coagulates a strong solution of the salt to a spongy mass. Exposed to the air, it gradually effloresces and loses its pungent odour, and becomes a bicarbonate, owing to the volatilization of the neutral carbonate of ammonia it contains.

The constitution of this salt when freshly prepared appears to be that of a sesquicarbonate, and to contain 2 equivalents of ammonia, 3 equivalents of carbonic acid, and 2 equivalents of water; and it may be represented as a bicarbonate of the oxide of ammonium and water, together with a neutral carbonate of ammonia. Formula, $HO, NH_4 O, 2 CO_2 + NH_3, CO_2$. By exposure to air, the neutral salt, which is volatile and pungent, escapes, leaving the odourless bicarbonate.

Sesquicarbonate of ammonia is decomposed by the acids, the fixed alkalies and their carbonates, bitartrate of potassa, sulphate of magnesia, the metallic salts, except the potassio-tartrate of iron, baryta, lime, and partially by magnesia. If it contain sulphate of ammonia, which is sometimes the case, this is detected by adding nitrate of baryta to the solution, after dropping into it a few minims of nitric acid; if a precipitate fall, the sulphate is present: if nitrate of silver causes a precipitate, this indicates the presence of sal ammoniac. The London College gives the following character of this salt: "Free from colour, semitransparent, of a pungent smell and taste, colours turmeric brown, volatilizes by heat, and is soluble in water; when neutralized with nitric acid, it is not precipitated either by chloride of barium or nitrate of silver."

Medical properties and uses. — This salt is stimulant, antispasmodic, antacid, diaphoretic, and in large doses emetic. In very large doses it is a narcotico-irritant poison; but in moderate doses it is beneficially given in gout, hysteria, and dyspeptic affections,

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water joint, and it has a pipe in the bottom which is left open to admit the liquid products evolved during the sublimation to escape. *Grey's Operative Chemist*, p. 596. Large quantities, but very impure, are also produced in the distillation for the preparation of gas. It was originally procured from urine by Raymond Lully, and from sal ammoniac decomposed by potassa by Basil Valentine in the thirteenth century.

[1] *Annales de Chimie*, xxviii. 12.

when much acid is present in the stomach; and in infantile convulsions connected with dentition, or with acidity of the primæ viæ. As a diaphoretic it is occasionally exhibited in chronic rheumatism, in combination with guaiacum; and sometimes, although rarely, it is employed as an emetic to produce vomiting in gouty and paralytic cases. It has been recommended by Dr. Barlow in diabetes.[1] From the ammonia it contains in excess, the sesquicarbonate is applied as a local stimulant to the nostrils in syncope, hysteria, and languors; and with the addition of a little volatile oil, it forms the common smelling-salts of the shops. One part of pulverized sesquicarbonate of ammonia, and three parts of extract of belladonna, spread on leather in the form of a plaster, is an excellent application for allaying rheumatic pains. It is also used in making effervescing draughts; 20 grains of it, in solution, saturate f ʒ vi. of lemon juice; 24 grains of citric acid, and 25 grains of tartaric acid. The ordinary dose is from grs. v. to grs. xx. formed into pills, or dissolved in any aqueous vehicle; but to excite vomiting ʒ ss. may be given for a dose, and repeated if necessary, assisting its operation by plentiful dilution.

Officinal preparations.—*Liquor Ammoniæ Sesquicarbonatis*, L. *Aqua Carbonatis Ammoniæ*, E. *Linimentum Ammoniæ Sesquicarbonatis*, L.

AMMONIÆ BICARBONAS, Dub. *Bicarbonate of Ammonia.*

"Take of commercial sesquicarbonate of ammonia any convenient quantity. Reduce it to a fine powder, and having spread it on a sheet of paper, expose it to the air for twenty-four hours. Let it be now enclosed in a well-stopped bottle."

The theory of this process is as follows: — The common sesquicarbonate is a mixed salt containing a volatile carbonate united to the bicarbonate of ammonia; by exposure the volatile carbonate flies off, leaving the bicarbonate behind. This salt can be crystallized in small six-sided prisms, having scarcely any odour, and less taste than the sesquicarbonate. It is volatilized by heat; dissolves in eight parts of water; and is decomposed by potassa with the disengagement of ammonia. According to Mr. Phillips, it is a compound of 55·50 of carbonic acid, 21·16 of ammonia, and 22·34 of water = 100 parts; or of 2 eq. of carbonic acid + 1 of ammonia + 2 water. Formula, $NH_4\,O, CO_2 + HO, CO_2$. Or a double carbonate of oxide of ammonium and carbonate of water.

Medical properties and uses. — The same as those of the sesquicarbonate. Its dose is from six to twenty-four grains. It may be given in combination with sulphate of magnesia.

[1] *Guy's Hospital Reports*, v.

LIQUOR AMMONIÆ SESQUICARBONATIS, Lond. AQUA AMMONIÆ CARBONATIS, Edin. *Solution of Sesquicarbonate of Ammonia.*

"Take of sesquicarbonate of ammonia, *four ounces;* distilled water, *a pint.* Dissolve and strain."

The Edinburgh quantities and directions are the same.

Syn. Soucarbonate d'ammoniaque (*F.*), Kohlensaures Ammonium liquor (*G.*), Liquore Sotto-carbonato di ammoniaco (*I.*).

This solution has the odour and taste of the concrete sesquicarbonate; it is limpid and colourless; and when shaken with twice its bulk of alcohol, a nearly uniform coagulum is formed. The specific gravity should be 1150. It ought to be kept in small, swell-stopped bottles, as by exposure to the air its pungency suffers diminution.

Medical properties and uses. — The same as those of the concrete salt. It is given in doses of from f ʒss. to f ʒj. in any bland fluid.

LIQUOR AMMONIÆ ACETATIS, Lond. Dub. *Solution of Acetate of Ammonia.*

"Take of dilute acetic acid, a pint; sesquicarbonate of ammonia, nine drachms, or as much as may be necessary. Add to the acid the sesquicarbonate to saturation."

Dublin.

"Take of sesquicarbonate of ammonia, in fine powder, two ounces and a half, or a sufficient quantity; dilute acetic acid three pints to the acid introduced into a bottle; gradually add the sesquicarbonate of ammonia to saturation, and dissolve by shaking, but without the aid of heat. The specific gravity of this solution is 1012."

AMMONIÆ ACETATIS AQUA, Edin. *Water of Acetate of Ammonia.*

"Take of distilled vinegar (from French vinegar in preference) *twenty-four fluid ounces,* carbonate of ammonia one ounce. Mix them and dissolve the salt. If the solution has any bitterness, add by degrees a little distilled vinegar till that taste be removed. The density of the distilled vinegar should be 1005, and that of the aqua acetatis ammoniæ 1011."

Syn. Acetate d'ammoniaque liquide (*F.*). Essigsaures Ammoniak-flussigkiet (*G.*), Liquore di Minderero (*I.*).

The sesquicarbonate of ammonia employed for this preparation

is decomposed by the acetic acid of the distilled vinegar; which, combining with the ammonia, forms an acetate that remains dissolved in the water, while the disengaged carbonic acid flies off in the form of gas, exciting effervescence. In our experiments, distilled vinegar of a specific gravity of 1·007 required 320 grains of the sesquicarbonate to saturate a pint.[1] Owing, however, to the variable proportion of acid in distilled vinegar, this preparation cannot be obtained of an uniform strength; and provided it be accurately neutralised, which is easily known by using litmus and turmeric paper, its uniformity of strength is of little importance. It should never, as Dr. Christison justly remarks, be made with pyroligneous acid, reduced to the strength of distilled vinegar; as it is more apt to spoil.[2] If it be not accurately saturated, some of the metallic salts, particularly those of antimony, which are often ordered in conjunction with it, are decomposed.

Qualities. — This solution is inodorous; has a slightly nauseous taste; and, when made with pure materials, is limpid and nearly colourless. It is decomposed by the fixed alkalies, the strong acids, alum, magnesia, lime-water, sulphate of magnesia, bichloride of mercury, nitrate of silver, the sulphates of zinc, copper, and iron, and acetate and diacetate of lead, which are consequently incompatible in formulæ with it.[3] The tests ordered by the London College are as follows: — Freedom from colour and odour, specific gravity 1022; does not change the colour of litmus or turmeric; not coloured nor precipitated by hydrosulphuric acid or chloride of barium; and what is precipitated by nitrate of silver is soluble in water, and especially in nitric acid: the first is sufficient to detect salts of copper or lead, the second sulphuric acid or sulphates, the third chlorides. Potash added to the solution causes the evolution of ammonia and sulphuric acid, acetic vapours.

Medical properties and uses. — As a diaphoretic it is in common use in febrile diseases; and may be combined with opium, camphor, antimonials, or nitrate of potassa. It is necessary to assist its determination to the skin with plentiful dilution, and a moderate degree of external heat; for by free exposure to cool air it excites the kidneys, instead of opening the skin. Externally it is employed as a discutient; as a lotion to inflamed surfaces; and when diluted with rose-water, holding in solution a small portion of opium, it is an excellent collyrium in chronic ophthalmia; and, still

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[1] The mercury of a thermometer, the bulb of which was immersed in the solution while effervescing, sunk five degrees.

[2] *Dispensatory.*

[3] M. de Lassone first obtained the salt crystallized by sublimation, in long slender, flatted crystals, terminating in sharp points, an inch in length, and of a pearl-white colour. I have obtained them three times that length. They are very deliquescent; impress on the tongue a sense of coldness and sweetness; melt at 170°, and sublime at about 250°. According to Richter, they consist of 68·77 acid, and 31·23 base. They may be readily procured by passing a stream of ammoniacal gas into a solution of strong acetic acid.

more largely diluted, it is occasionally used as an injection in the commencement of gonorrhœa. In the crystallized form it has proved beneficial in painful menstruation. I have ordered it, with the best effect, as a lotion in porrigo, affecting the scalp. The crystallized salt allays the pain in difficult menstruation; and the solution is said to dispel the effects of intoxication. The ordinary dose of the solution is from f℥ iv. to f ℥ xij., given every three or four hours.

LIQUOR AMMONIÆ CITRATIS, Lond. *Solution of Citrate of Ammonia.*

"Take of citric acid, three ounces; distilled water, a pint; sesquicarbonate of ammonia, two ounces and a half, or as much as may be sufficient. Dissolve the acid in the water, and add the sesquicarbonate to saturation."

Qualities and uses. — Very similar, but of pleasanter flavour, than the solution of the acetate of ammonia. Used for similar purposes, and in similar doses.

AMMONIÆ HYDROSULPHURETUM, Dub. See *Preparations of Sulphur.*

AMMONIÆ OXALAS, Edin. (Tests.) *Oxalate of Ammonia.*

"Take of oxalic acid, *four ounces;* carbonate of ammonia, *eight ounces;* distilled water, *four pints.* Dissolve the carbonate in the water, add gradually the acid, boil and concentrate sufficiently for crystals to form on cooling."

This salt is now introduced into the appendix of the London Pharmacopœia. It is used only as a test for the presence of lime.

II. *ALKALOIDS AND THEIR SALTS.*

ACONITINA. Now omitted from Pharmacopœia. See *Aconitum*, Part II.

ATROPIÆ SULPHAS, Lond. *Sulphate of Atropia.*

"Take of dilute sulphuric acid, *two fluid drachms;* atropia, *seven scruples and a half,* or as much as may be necessary; distilled water, *half a fluid ounce.* Add the atropia gradually, to the acid mixed with water, to saturation. Let the solution be filtered, and evaporate at a gentle heat, that crystals may be formed. We intend this salt only for external use."

Qualities. — This salt is crystallized with much difficulty, having a considerable tendency to assume a gummy condition. Its composition is probably represented by the formula $C_{34}H_{23}NO_6$, HO, SO_3. It is much more soluble in water than the alkaloid, and the solution displays all the reactions spoken of under Atropia, Part II. It is reddened by tincture of iodine, precipitated yellow by the chloride of gold, and also thrown down by solutions containing tannic acid.

Medical properties and uses. — Sulphate of atropia is intended by the London College for external use only. It may be employed either in the form of solution or ointment. A solution containing from gr. j. to grs. iv. of the salt to the fluid ounce has been recently much used for the purpose of dilating the pupils; a few drops are sufficient to cause full dilatation in about a quarter of an hour, and is a much more elegant application than the extract rubbed up with water. An ointment composed of from gr. j. to gr. ij. of the salt to ʒ j. of lard has been used with success as an application in neuralgic affections.

If given internally, the dose of the salt must be very small; $\frac{1}{20}$ gr. given three times a day will not unfrequently induce dryness of the throat and dilatation of the pupils, and the other effects arising from a large dose of belladonna. In place of using the sulphate of atropia we may employ the alkaloid itself, and, dissolving it by the aid of a drop of acetic, dilute sulphuric or any other acid. The alkaloid itself can readily be obtained in crystals.

MORPHIA, Dub. *Morphia.*[1]

[1] The following (Dr. Mohr's) process for obtaining morphia from the opium direct, hould be known.

The opium is to be three or four times successively macerated with three times its weight of water; and strongly pressed after each maceration. To the mixed liquids, milk of lime, in which the lime should amount to from $\frac{1}{6}$ to $\frac{1}{4}$ of the weight of opium employed, is next to be added. The solution of opium should be added to the milk of lime while the latter is at the boiling temperature, and then the whole boiled for some minutes. The hot mixture is then to be strained through linen. The residue on the cloth must be washed with boiling water, and the washings being added to the previously filtered liquid — the whole must be evaporated until it is about twice the weight of the opium used; and then refiltered to separate a little carbonate of lime which is always formed. To the filtered liquid, raised to the boiling point, powdered sal ammoniac is next to be added, in the proportion of thirty grains for every 500 grains of opium employed. By this means the morphia is precipitated; and though not free from colouring matter, much more so than by other processes.

By this process the Narcotina is entirely, and the colouring matter to a very great extent, precipitated; both are retained by the lime; whilst the whole of the morphia is obtained by the subsequent steps. If the liquid to which the sal ammoniac is added be very much concentrated, an immediate considerable precipitate is obtained, which the boiling passes into crystalline needles. If the concentration be not great, no immediate precipitation is produced, but soon afterwards here and there white needle-form crystals are discovered, and then the liquid becomes rapidly filled, perhaps to half its height, with similar crystals.

The morphia thus obtained may be further purified by solution in dilute hydro-

"Take of Turkey opium, cut into thin slices, *one pound;* distilled water, *six pints;* chloride of calcium, *six drachms;* prepared animal charcoal, *as much as is sufficient.* Macerate the opium for twenty-four hours with a quart of the water, and decant. Macerate the residuum for twelve hours with a second quart of the water, decant, and repeat this process with the rest of the water, subjecting the insoluble residuum to strong expression. Let the decanted solutions and expressed liquor be evaporated by a steam or water heat to the bulk of one pint, and then pass through a calico filter. Pour in now the chloride of calcium, first dissolved in four ounces of distilled water, and then proceed with the evaporation until the solution is so far concentrated that, upon cooling, nearly the whole of it becomes solid. Let this solid matter be enveloped in a couple of folds of strong calico, and subjected to powerful pressure, the dark liquid which exudes being reserved for subsequent use. The squeezed cake is now to be acted upon with about half a pint of boiling water, and, the whole being thrown upon a paper filter, the precipitate must be well washed. The filtered solution having been evaporated as before, cooled, and solidified, the residue is to be again subjected to expression. If the product be not quite white, this process should be repeated a third time, the liquid forced out during expression being always preserved. Let the squeezed cake be dissolved in six ounces of boiling water, and, if necessary, cleared by filtration through prepared animal charcoal, the portion of it soaked by the filter being carefully washed out of it; and, to the solution thus obtained, let water of ammonia be added in slight excess, and let the crystalline precipitate, which forms when the liquor has cooled, be collected on a paper filter, and washed with cold distilled water until the washings cease to give a precipitate upon being dropped into an acid solution of nitrate of silver. Lastly, let the filter be transferred to a porous brick, in order that the morphia it contains may become dry. The liquids separated by expression from the muriate of morphia, in the preceding process, having been diluted with water, so as to occupy the bulk of four ounces, and then supersaturated slightly with ammonia, let the precipitate which forms be collected, after the lapse of six hours, on a filter, and washed with a little cold water. This, if redissolved in dilute muriatic acid, boiled with a little animal charcoal and filtered, will, upon cooling, afford a crystalline deposit, from which, when pressed, dissolved in water, and supersaturated with ammonia, an additional quantity of morphia will be procured."

For properties of morphia, see *Papaver*, Part II.

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chloric acid and crystallizing the hydrochlorate, which must then be redissolved and treated with milk of lime and sal ammoniac in the same manner as the solution of opium. — *Annalen der Chemie und Pharm.* vol. xxxv. cap. l. p. 119.

The Dublin College orders morphia to be prepared for the purpose of forming from it the acetate and muriate of the alkaloid. The theory of the process is given under *Morphiæ Murias*, Edin.

MORPHIÆ ACETAS, Edin. Dub. *Acetate of Morphia.*

"Take of muriate of morphia, *any convenient quantity;* dissolve it in fourteen times its weight of warm water; and when the solution is cool, add aqua ammoniæ gradually and with constant agitation, until there is a permanent but faint odour of ammonia in the fluid. Collect the precipitate on a calico filter, wash it moderately with cold water, and dissolve it by means of a slight excess of pyroligneous acid in twelve parts of warm water for every part of muriate of morphia that was used. Concentrate the solution over the vapour-bath, and set it aside to crystallize. Drain and squeeze the crystals, and dry them with a gentle heat. More acetate of morphia may be obtained on concentrating the mother-liquor."

Dublin.

"Take of morphia in fine powder, *one ounce;* rectified spirit, *eight fluid ounces;* acetic acid of commerce sp. gr. 1044, *four fluid drachms and a half*, or *as much as is sufficient.* Pour the spirit on the morphia, and, applying heat, gradually add the acetic acid, until a neutral or slightly acid solution is obtained. Let this be evaporated to the consistence of syrup, by a steam or water heat, and then set by for a few days, until it solidifies. In operations on a great scale, it will be worth while to remove the spirit by distillation."

In the Edinburgh process, morphia is first thrown down, from a solution of the muriate, by means of ammonia added in very slight excess; this, after being collected, is converted into an acetate by dissolving it in slight excess of pyroligneous acid, and evaporating until crystallization takes place. In the Dublin process, this salt is prepared directly from the morphia itself, by solution in acetic acid.

Qualities. — Acetate of morphia rarely crystallizes in a regular manner; it is usually in the form of a greyish-white powder, which, when examined by a magnifying lens, displays irregular radiated masses of acicular crystals. It is also deliquescent, which varies its strength when it is kept for some time. It is very soluble in water; which should be slightly acidulated, as the salt is partially decomposed by water. The solution is decomposed by the alkalies, their carbonates, and the metallic salts, and the morphia precipitated. The best mode of employing the acetate is to dissolve a given weight of the morphia in an excess of diluted acetic acid. Acetate of morphia is a compound of 1 eq. of morphia + 1 eq. of acetic acid + 1 eq. of water.

The following are the tests given in the London and Edinburgh Pharmacopœias:—"Soluble in water and rectified spirit; and when the spirit is distilled from the solution, it yields crystals which are totally destroyed by heat. On the addition of nitric acid, it first becomes red and then yellow. Tincture of sesquichloride of iron turns it a blue colour. If chlorine recently prepared be added, and then ammonia, a brown colour is produced, which disappears on the addition of more chlorine. Morphia is precipitated by solution of potash, but, if added in excess, the precipitate is redissolved." (Lond.)

"100 measures of a solution, 10 grains in half a fluid ounce of water, and 5 minims of acetic acid, heated near 212°, and decomposed by a faint excess of ammonia, yield by agitation a precipitate, which in 24 hours occupies 15·5 measures of the liquid." (Edin.)

Medical properties and uses. — Acetate of morphia possesses narcotic powers, and may be employed in all cases in which opium is useful: but it has an advantage over opium in not causing either headache or sickness. It is said to determine more to the skin than opium. The dose is from gr. $\frac{1}{6}$ to gr. $\frac{1}{2}$, in any bland vehicle.

LIQUOR MORPHIÆ ACETATIS, Lond. Dub. *Solution of Acetate of Morphia.*

"Take of acetate of morphia, *four drachms;* acetic acid, *fifteen minims;* distilled water, *a pint;* proof spirit, *half a pint.* Mix and dissolve."

Dublin.

"Take of acetate of morphia, *eighty-two grains;* rectified spirit, *five fluid ounces;* distilled water, *fifteen ounces.* Having added the spirit to the water, dissolve the acetate of morphia in the mixture: and if the solution is not quite clear, pass it through a paper filter."

One grain of the acetate of morphia is contained in about 60 minims of the London, and in about 120 minims of the Dublin, preparation. These solutions, unfortunately, differ greatly in strength, — the London being twice the strength of the Dublin: f. ʒ j. of the London preparation contains 1 grain of the salt; f. ʒ j. of the Dublin, half a grain.

MORPHIÆ MURIAS, Edin. Dub. *Muriate of Morphia.* Called in London List of Materia Medica, Morphiæ Hydrochloras.

"Take of opium, *twenty ounces;* water, *eight pints;* muriate of

lime, *one ounce*, or *a slight excess.* Macerate the opium in fragments for twenty-four hours in two pints of the water; and separate the infusion, squeezing well the residue. Repeat the maceration successively with two pints more of the water till the whole is made use of. Concentrate the whole infusions over the vapour-bath to one pint, and add the muriate of lime dissolved in four fluid ounces of water. Set the whole aside to settle; pour off the liquid; wash the sediment with a little water, adding the washings to the liquid. Evaporate the liquid sufficiently in the vapour-bath for it to solidify on cooling. Subject the cooled mass to very strong pressure in a cloth; redissolve the cake in a sufficiency of warm distilled water; add a little fine powder of white marble, and filter; acidulate the filtered fluid with a very little muriatic acid; and concentrate a second time in the vapour-bath for crystallization. Subject the crystals again to very strong pressure in a cloth. Repeat the process of solution, clarification by marble and muriatic acid, concentration and crystallization, until a snow-white mass be obtained.

"On the small scale trouble and loss are saved by decolorizing the solution of muriate of morphia by means of a little purified animal charcoal after two crystallizations. But on the large scale it is better to purify the salt by repeated crystallizations alone, and to treat all the expressed fluids, except the first, in the same way with the original solution of impure muriate of morphia. An additional quantity of salt may often be got from the first dark and resinous fluid obtained by expression, on merely allowing it to remain at rest for a few months, when a little muriate of morphia may be deposited in an impure condition.

"The opium which yields the largest quantity of precipitate by carbonate of soda, according to the formula[1], yields muriate of morphia, not only in greatest proportion, but likewise with the fewest crystallizations."

Dublin.

"Take of morphia in fine powder, *one ounce;* pure muriatic acid, *four fluid drachms and a half*, or *a sufficient quantity;* distilled water, *two ounces and a half.* Mix the acid with the water, heat to about 200° Fahr., and add the morphia, constantly stirring, so that a solution may be formed having a slightly acid reaction; set this to cool for twelve hours, and let the crystals which separate be drained of the liquor which surrounds them, and dried on

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[1] A solution from 100 grs. of fine opium macerated twenty-four hours in f℥ij. of water, filtered and strongly squeezed in a cloth, if treated with a cold solution of ʒiv. of carbonate of soda in two waters, yields a precipitate, which weighs, when dried, at least gr. x., and dissolves entirely in solution of oxalic acid. — *Edin, Pharm.* p. 29.

blotting paper. The decanted liquor will, on further concentration and cooling, give additional crystals."

In the Edinburgh process the meconate of morphia contained in the opium is decomposed by chloride of calcium: at the same time a portion of the water is also decomposed, in order to furnish hydrogen to the chlorine to change it into hydrochloric acid, and oxygen to the calcium, to form it into protoxide: the former unites with the morphia to form the hydrochlorate; and the latter with the freed meconic acid to form a meconate of lime, which is precipitated. As opium contains a small proportion of sulphuric acid, a little sulphate of lime is also precipitated with the meconate. The repeated subjecting of the crystals to pressure and resolution, is for the purpose of separating the impurities of the mother-liquor from the muriate; this is also ordered to be occasionally effected by means of a little animal charcoal. In the Dublin process the salt is procured simply by uniting the morphia with hydrochloric acid, evaporating, and crystallizing."

The process which I have proposed is, in my opinion, much simpler, and capable of obtaining a larger quantity of the hydrochlorate from a given quantity of opium. It consists in rubbing the opium, in a hard, dry state, into a powder with clean sand, moistening the mass, and putting the whole into a glass percolater[1], with a piece of clean rag tied over the lower opening, and passing cold distilled water through it until the liquid passes tasteless. This solution is then to be evaporated to the consistence of syrup, and thrown into four times the quantity of distilled water, and the fæces allowed to subside. The fluid is next to be decanted, and the residue well washed with distilled water. To the separated fluids a saturated solution of diacetate of lead is added as long as any precipitate takes place: the meconate of lead, the gum, and the greater part of the resin, are thus precipitated; whilst the supernatant fluid holds in solution acetate of morphia, and a little acetate of lead. To this fluid filtered, sulphuric acid is added: it precipitates any oxide of lead that may be uncombined, as an insoluble sulphate, and, at the same time, decomposes the acetate of morphia, leaving in the solution sulphate of morphia, and free acetic acid, the latter of which is driven off by boiling. To the boiled solution chloride of barium is next to be added, until no more precipitate is thrown down; and the insoluble sulphate of baryta, thus formed, is to be separated by the filter, and well washed upon it. The fluid is now to be evaporated by a gentle heat to form crystals, which are to be pressed, redissolved in water, and digested with pure animal charcoal, at a temperature of 120°, and strained. The strained fluid and the washings of the charcoal

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[1] For the description and a figure of this instrument see *Part* I.

are lastly to be submitted to cautious evaporation, to form crystals. The residual fluid, from the pressure of the first crystals, being evaporated nearly to dryness, is to be largely diluted, and treated as before, to obtain any hydrochlorate of morphia which remains in solution.

I have procured a much larger proportion of hydrochlorate of morphia and purer by this process, than by the processes of the Pharmacopœias. The best opium for yielding it is the Smyrna.

Qualities. — Hydrochlorate of morphia crystallizes in tufts of acicular crystals, which are nearly colourless, inodorous, and bitter; little soluble in alcohol, but readily soluble in 20 parts of water at 60°, and in 10 parts at 212°. It generally contains more or less of codeia. The crystals consist of one eq. of morphia + 1 of hydrochloric acid, and 6 of water. The solution of this hydrochlorate is decomposed by the alkalies, ammonia, nitrate of silver, and the salts of lead; consequently it is incompatible in prescriptions with these salts.

In the London and Edinburgh Pharmacopœias the following tests are given: —

"It is soluble in rectified spirit, and in water. What is precipitated from the watery solution by nitrate of silver is not perfectly dissolved either by ammonia, unless added in excess, or by hydrochloric or nitric acid. Its other characters correspond with those of acetate of morphia." (Lond.) "100 measures of a solution of 10 grains in half a fluid ounce of water, heated to 212°, and decomposed with agitation by a faint excess of ammonia, yield a precipitate which, in 24 hours, occupies 12·5 measures of the liquid." (Edin.)

Medical properties and uses. — The hydrochlorate of morphia is employed as a narcotic, and is preferred to the acetate, on account of its more definite strength, and owing to its exciting less perspiration. It is, also, much less subject to decomposition than the acetate. Its dose is from gr. $\frac{1}{4}$ to gr. $\frac{1}{2}$, in any bland fluid. In doses of gr. viij. and upwards it proves a fatal poison.

LIQUOR MORPHIÆ HYDROCHLORATIS, Lond. MORPHIÆ MURIATIS SOLUTIO VEL LIQUOR, Edin. Dub. *Solution of Hydrochlorate*, or *Muriate of Morphia.*

"Take of hydrochlorate of morphia, *four drachms;* distilled water, *a pint;* proof spirit, *half a pint.* Mix and dissolve."

Edinburgh.

"Take of muriate of morphia, *one drachm and a half;* rectified spirits, *five fluid ounces;* distilled water, *fifteen fluid ounces.* Mix the spirit and water, and dissolve the muriate of morphia in the mixture with the aid of a gentle heat."

Dublin.

"Take of muriate of morphia, *ninety grains;* rectified spirit, *five fluid ounces;* distilled water, *fifteen fluid ounces.* Mix the spirit and water; dissolve the muriate of morphia in the mixture; and unless the solution be quite clear, pass it through a paper filter."

The intention of these solutions is to facilitate the administration of the salt in minute doses. The spirit prevents decomposition. One grain of hydrochlorate of morphia is contained in 60 minims of the London, and in about 107 minims of the Edinburgh and Dublin solutions.

QUINÆ SULPHAS, Edin. Dub. *Sulphate of Quina.* Called by the London College, *Quinæ Disulphas;* and placed in the Materia Medica.

Syn. Sulphate de Quinine (*F.*), Schwefelsaures Quinin (*G.*), Serisokisloi Chinin (*Russ.*), Solfato di Quinina (*I.*).

"Take of yellow cinchona bark, in coarse powder, *one pound;* carbonate of soda, *eight ounces;* sulphuric acid, *half a fluid ounce;* purified animal charcoal, *two drachms.* Boil the bark for an hour in four pints of water, in which half the carbonate of soda has been dissolved; strain and express strongly through linen or calico; moisten the residuum with water, and express again; and repeat this twice. Boil the residuum for half an hour with four pints of water and half the sulphuric acid; strain, express strongly, moisten with water, and express again. Boil the residuum with three pints of water, and a fourth part of the acid; strain and squeeze as before. Boil again the residuum with the same quantity of water and acid, strain and squeeze as formerly. Concentrate the whole acid liquids to about a pint; let the product cool; filter it; and dissolve in it the remainder of the carbonate of soda. Collect the impure quina on a cloth, wash it slightly, and squeeze out the liquor with the hand. Break down the moist precipitate in a pint of distilled water, add nearly one fluid scruple of sulphuric acid, heat it to 212°, and stir occasionally. Should any precipitate retain its grey colour, and the liquid be neutral, add sulphuric acid drop by drop, stirring constantly till the grey colour disappears. Should the liquid redden litmus, neutralize it with a little carbonate of soda. Should crystals form on the surface, add boiling distilled water to dissolve them. Filter through paper, preserving the funnel hot; set the liquid aside to crystallize; collect and squeeze the crystals; dissolve them in a pint of distilled water heated to 212°; digest the solution for fifteen minutes with the animal charcoal; filter and crystallize as before. Dry the crystals with a heat not exceeding 140°.

"The mother-liquors of each crystallization will yield a little more salt by concentration and cooling."

Dublin.

"Take of yellow bark, in powder, *one pound;* water, *one gallon and a half;* oil of vitriol of commerce, *half a fluid ounce;* rectified spirit, *three pints;* slaked lime, *one ounce;* animal charcoal, *half an ounce;* dilute sulphuric acid, *half a fluid ounce,* or *a sufficient quantity.* Macerate the bark for twenty-four hours with half a gallon of the water, acidulated with two drachms of the oil of vitriol, then boil for half an hour, and decant. Boil the residue with a second half gallon of the water, acidulated with one drachm of the oil of vitriol, and again decant, and let this process be a third time performed with the rest of the water and the residual drachm of oil of vitriol. Let the decanted liquors be evaporated to the bulk of one quart, and filtered through calico when cold, and to the solution thus obtained add the lime, until the mixture becomes decidedly alkaline. The precipitate collected on a calico filter is to be washed with about a pint of cold water, and, when partially dried on porous bricks, to be enveloped in blotting paper and subjected to a powerful pressure; the pressed mass must now be introduced into a flask containing a pint of the spirit, which is to be raised to and maintained at the temperature of ebullition for twenty minutes, and then, after the subsidence of the insoluble matter, decanted. This process having been repeated successively with the second and third pints of spirit, and the undissolved residuum having been subjected to expression, let the decanted and expressed liquors be cleaned by passing them through a paper filter, and then subjected to distillation, so as to recover the entire of the spirit: the brown viscid mass which remains is now to be mixed with sixteen ounces of water, and, thus being raised to the boiling point, the dilute sulphuric acid must be added so as to produce a neutral or very slightly acid solution. Add now the animal charcoal, boil for five minutes, filter, and set to cool, in order that crystals may be formed, which are to be dried on blotting paper by mere exposure to the atmosphere. The liquor decanted from the crystals will, by further concentration and cooling, yield an additional product."

In these processes, the kinate of quina is taken up more readily by the acidulated water than it would be by simple distilled water.

In the Edinburgh process, the intention of the carbonate of soda is to remove, in the first place, the resin, the colouring principle, and the kinic and cinchonic acids of the bark, which enables the sulphuric acid to exhaust the residue more completely of its alkaloids. The decomposition of the sulphate is to obtain the acid in a purer condition for forming the disulphate. The Dublin process, which is a modification of that of M. Henry, has the disadvantage

of requiring the use of rectified spirit; which is a most expensive part of the process in this country. Lime is also used in place of carbonate of soda.

This salt is frequently adulterated either with mannite, sugar, or gum, or starch, or sulphate of lime, or acetate of lime. The mannite is detected by dissolving the suspected disulphate in alcohol; the sulphate is dissolved, but the mannite, which is soluble in water, is left and has a sweet taste. The sugar is readily detected by dissolving the suspected salt in water, and precipitating the quina by liquor potassæ: as this destroys the bitterness of the solution, the presence of the sugar becomes obvious by its taste. Gum is detected by digesting the salt in strong alcohol: the sulphate is dissolved and the impurities are left. Starch is detected by boiling the salt, and when cold testing the solution with tincture of iodine. If salicine be present, sulphuric acid turns the salt red. The sulphate and acetate of lime are detected by exposing the suspected salt to a strong heat; the disulphate of quina is totally consumed, whilst the lime of the adulterating salts remains. Alcohol also detects these salts of lime by not dissolving them.

Qualities. — The sulphate or more properly the disulphate of quina crystallizes in delicate acicular crystals, inodorous, and impressing an intensely bitter taste on the palate. The crystals lose three-fourths of their water of crystallization when exposed to the air. They melt at 240°, and are charred and destroyed at a red heat. They require for their solution 740 parts of water at 60°, and 30 parts at 212°: but 80 parts only of cold alcohol, of sp. gr. 850. They dissolve freely in alcohol at 212°. The constituents of the salt are 2 eq. of quina, 1 eq. of acid, 8 eq. of water.[1] The neutral sulphate is more soluble, and crystallizes in small needles.

The London College gives the following characters of this salt: — "It is dissolved by water, especially when mixed with an acid, and quina is precipitated on the addition of ammonia; the liquor after evaporation should not taste of sugar. From 100 grains of disulphate of quina, 8 to 10 grains are expelled by a gentle heat. It is destroyed by heat: recently prepared chlorine being added to it, and then ammonia, it becomes green. From 100 grains dissolved in water, mixed with hydrochloric acid, 26·6 grains of sulphate of baryta, dried at a red heat, are obtained."

Disulphate of quina is incompatible in prescriptions with alkalies and their carbonates, lime-water, chloride of calcium, chloride of barium, the salts of baryta, those of the oxide of lead, and astringent vegetable infusions and decoctions. It may be administered with sulphate of iron, and all the sulphates, and with acetate and hydrochlorate of morphia.

[1] According to Baup, the proportions are 76·272 of quina + 8·714 of acid + 15·254 of water.

Medical properties and uses. — Disulphate of quina is a stimulant, tonic, and antiperiodic. It excites the tissues to which it is applied, and, being taken into the circulation, augments the vigour and regulates the action of the heart and arterial system. Owing to its topical influence, in irritable states of the mucous membrane, and when over-dosed, it disorders the digestive organs, causing heat in the epigastrium, foul tongue, nausea, and headache; and in plethoric habits, hæmorrhages. In doses not exceeding a grain, dissolved in f ℥ iss. infusion of roses, or of the confection of roses, acidulated with diluted nitric acid [1], it is an excellent tonic in dyspeptic affections; and in doses of two grains to three grains, given every second hour, in the intervals of the paroxysms of ague and other periodic affections, it rapidly checks the progress of these diseases. Some practitioners administer from grs. viij. to grs. x. immediately before the accession of the paroxysm; but my own experience is in favour of small doses at short intervals. M. Sadillot recommends it to be administered in the following form, in combination with opium: — Quinæ disulphatis, grs. xij.; Opii, grs. iij.; Confect. Rosæ, q. s., fiant pilulæ x.: one every hour, or every two hours in the intermission of ague. It has been successfully administered in acute rheumatism by M. Briquet. He dissolves from 75 to 90 grains in ℥ xij. acidulated fluid, and administers one table spoonful every hour during the day. The feverish symptoms soon abate, and with them the swelling and pains of the joints disappear. These large doses caused at first vertigo, tinnitus aurium, transient dimness of sight, and sometimes vomiting and purging, but they gradually passed away with the symptoms of the disease.[2] As a general tonic, when the mucous membrane is in an irritable condition, or when diarrhœa is present, the decoction of the bark is preferable to the disulphate of quina. This salt has been employed as a liniment in intermittents. Eight grains dissolved in f ℨ iv. of rectified spirit are rubbed upon the spine: first one-half the quantity, and then the remainder after an interval of half an hour.[3] The dose as a simple tonic is from gr. j. to grs. ij.; as an antiperiodic, from grs. ij. to grs. xij. There is some reason for supposing that large doses may prove fatal. A case of this kind is described in the Gaz. de Hospitaux, Dec. 1842, in which vj. grains were taken every hour, until 48 grains were taken. The patient was suddenly seized with violent agitation and furious delirium, and died in a few hours.

The *Quinoidine, Chinoidine* or *Amorphous Quina* appears to possess medicinal powers identical with those of quina, but as met with in

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[1] Sulphuric acid, which is usually ordered, forms a turbid mixture.

[2] *Bull. d'Acad. Royale de Méd.* Nov. 1842. This method of treating acute rheumatism has not been adopted in this country, and, when the heart is implicated, it is probably not unattended with danger. ED.

[3] *Il Filiatre Sebezio,* Aug. 1841.

commerce it is usually very impure, and consequently proportionally inert. It has been asserted that it has been reduced to the state of crystallizable quina by M. Roder, by the action of protochloride of tin.[1]

Cinchonia and its salts also act upon the system in a manner very similar to quina salts: they have the power of arresting periodic diseases, and the value of the pale barks depends on the presence of this alkaloid. It appears, however, that cinchonia is less powerful than quina.

The salt of cinchonia generally employed is the disulphate, which readily crystallizes in flattened four-sided prisms, soluble in about 50 parts of cold water. A neutral sulphate can also be formed, corresponding to the neutral sulphate of quina.

QUINÆ MURIAS, Dub. *Muriate of Quina.*

"Take of sulphate of quina, *one ounce;* chloride of barium, *one hundred and twenty-three grains;* distilled water, *thirty-two ounces.* Dissolve the chloride of barium in two ounces of the water, and the sulphate of quina in the remainder, raised to the temperature of ebullition. Mix the two solutions, evaporate to one-half, filter, and continue the evaporation by means of a steam or water heat, until crystalline spiculæ begin to appear. The solution is now to be permitted to cool, and the crystals which separate to be dried on blotting paper. The liquor decanted off the crystals will, by farther concentration and cooling, yield an additional product."

Qualities. — Muriate or hydrochlorate of quina occurs in snow-white groups of feathery crystals; it is more soluble than the disulphate, but otherwise does not appear to possess any advantages: the dose is the same as the disulphate: it is ordered by the Dublin College to be used in forming the quinæ valerianas.

QUINÆ VALERIANAS, Dub. *Valerianate of Quina.*

"Take of muriate of quina, *seven drachms;* valerianate of soda, *one hundred and twenty-four grains;* distilled water, *sixteen*

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[1] In 1830, Quinoidine was stated by MM. Henry and Delondre to contain a new alkaloid, which they named Quinidin. Liebig has, since that time, asserted that the pure Quinoidine was an amorphous variety of Quina. More recently, the subject has been examined by M. J. Van Heijningen, who finds that the Quinoidine, as met with in Holland, contains from 50 to 60 per cent. of the Quinidin, or B. Quina as he has named it. This alkaloid appears, when dry, to have the same per-centage composition as Quina, but, in the hydrated state, the amount of water is less. The same is the case with some of its salts, which are much more soluble in water than the corresponding Quina salts. B. Quina also differs from common Quina in crystallizing readily from ether and alcohol, and in not exhibiting the test with chlorine and ammonia. In February, 1852, Mr. R. Howard has, in the "Pharmaceutical Journal," drawn attention to this new alkaloid, as he finds it contained, in considerable quantity, in the cinchona barks, and also in the ordinary disulphate of quina of the shops.

ounces. Dissolve the valerianate of soda in two ounces, and the muriate of quina in the remainder of the water, and, the temperature of each solution being raised to 120°, but not higher, let them be mixed, and let the mixture be set by for twenty-four hours, when the valerianate of quina will have become a mass of acicular crystals. Let these be pressed between folds of blotting paper, and dried without the application of artificial heat. Instead of weighing out seven drachms of muriate of quina, and dissolving it in water, as is above prescribed, we may employ the solution of the muriate prepared from an ounce of the sulphate, as directed in the formula for *Quinæ Murias*, such solution having been first evaporated to fourteen ounces. It may be observed here, that should it become necessary to evaporate a liquid containing valerianate of quina, care must be taken that its temperature does not rise higher than 120°."

The formation of this salt is simply one of double decomposition; valerianate of quina is formed, and, being not very soluble in cold water, crystallizes as the solution cools; whilst the chloride of sodium or common salt remains in solution.

Qualities. — Valerianate of quina occurs in silky needles, hexagonal prisms, of a satiny whiteness, possessing an odour of valerianic acid; the taste is bitter: it is rather sparingly soluble in cold, but much more soluble in hot, water; soluble also in alcohol.

When the watery solution is heated much above 120° Fahr., it is decomposed and assumes the form of a resinous or oily substance, which is no longer soluble in water; at the same time valerianic acid escapes.

This salt consists of 1 eq. of valerianic acid, 1 eq. of quina, with 2 eq. of water of crystallization.

Medical properties and uses. — This salt has been employed as an antispasmodic and antiperiodic: it probably possesses the united properties of valerianic acid and quina. It has been used in hysteria, neuralgia, and other nervous affections. Dose, gr. j. to gr. iij. two or three times a day, in the form of pills or recently dissolved in water. The watery solution appears slowly to decompose, with the escape of the acid, even at the ordinary temperature of the air.

STRYCHNIA, Edin. Dub. *Strychnia.*

"Take of nux vomica, *one pound;* quicklime, *an ounce and a half;* rectified spirit, *a sufficiency:* subject the nux vomica for two hours to the vapour of steam, chop or slice it, dry it thoroughly in the vapour-bath or hot air press, and immediately grind it in a coffee-mill. Macerate it for twelve hours in two pints of water, and boil it: strain through linen or calico, and squeeze the residuum: repeat the maceration and decoction twice with a pint and a half of water. Concentrate the decoctions to the consistence of

thin syrup; add the lime in the form of milk of lime; dry the precipitate in the vapour-bath, pulverize it, and boil it with successive portions of rectified spirit, till the spirit ceases to acquire a bitter taste. Distil off the spirit till the residuum be sufficiently concentrated to crystallize on cooling. Purify the crystals by repeated crystallization."

Dublin.

"Take of nux vomica, in powder, *one pound;* water, *one gallon and a half;* oil of vitriol of commerce, *half a fluid ounce;* slaked lime, *one ounce;* rectified spirit, *one quart;* dilute sulphuric acid, solution of ammonia, of each, *a sufficient quantity;* prepared animal charcoal, *half an ounce.* Macerate the nux vomica for twenty-four hours with half a gallon of water acidulated with two drachms of the acid, and, having boiled for half an hour, decant. Boil the residuum in a second half gallon of the water acidulated with one drachm of the acid; decant, and repeat this process with the remaining water and acid, the undissolved matter being finally submitted to strong expression: the decanted and expressed liquors having been passed through a filter and then evaporated to the consistence of a syrup, let this be boiled with the rectified spirit for twenty minutes, the lime being added in successive portions during the ebullition until the solution becomes decidedly alkaline; filter through paper, and, having drawn off by distillation the whole of the spirit, let the residuum be dissolved in the dilute sulphuric acid, and to the resulting liquid, after having been cleared by filtration, add the solution of ammonia in slight excess, and let the precipitate which forms be collected upon a paper filter, dried, and then dissolved in a minimum of boiling rectified spirit. Into this solution introduce the animal charcoal, digest for twenty minutes, then filter and allow the residual liquor to cool, when the strychnia will separate in crystals."

Strychnia exists in nux vomica in the form of an igasurate; in the above processes this salt is taken up either with water or acidulated water, and the watery extract treated with lime, which decomposes the igasurate, and leaves the strychnia, which is very insoluble, to precipitate. This precipitate is impure; it can, however, be purified by repeated crystallizations from alcohol (E.), or the residue, after the distillation of the spirit, may be converted by dilute sulphuric acid into sulphate of strychnia, and this salt, decomposed by the ammonia and the strychnia, again precipitated and afterwards crystallized from spirit (D.). The crystals formed in the alcoholic solution always contain some brucia, which, however, can be removed by maceration in diluted alcohol.[1] In the Edinburgh process, the mode of dividing the nux vomica, to enable it to be easily ground, is a great improvement.

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[1] Sixty-five grains of strychnia may be procured from lb. iv. of nux vomica.

Part of the strychnia sold in the shops is the production of the St. Ignatius' bean, which is said by Geiseler to yield 1·4 per cent. The purity of the alkaloid is ascertained by its not reddening nitric acid. It can be separated from brucia by the latter being much more soluble in cold alcohol, and also in water. Pure strychnia is completely dissipated when exposed to a strong heat.

Qualities. — Strychnia crystallizes in minute octohedral or quadrilateral prisms, inodorous, impressing an excessively bitter taste upon the palate; so bitter indeed, as to communicate the taste to 600,000 times their weight of water. It requires 6667 parts of water at 60°, and 2500 parts at 212°, for its solution. Strychnia is insoluble in very strong alcohol and in ether; but it dissolves readily in alcohol of a sp. gr. 850; and it is also soluble in the volatile oils. It has a decided alkaline reaction, and forms salts with the acids. Owing to the brucia which it generally contains, it strikes a blood red with nitric acid; but, when pure, it forms a pale straw-coloured solution. Its composition is represented by the formula $C_{42}\ H_{22}\ N_2\ O_4$ (Regnault).

Strychnia can be recognised by the action of certain oxidizing agents upon it; with chromic acid, it strikes a beautiful blue colour, and the same effect is also produced by rubbing it with a little peroxide of lead, and sulphuric acid containing about $\frac{1}{100}$ part of nitric acid; this colour soon passes into red and then yellow. Brucia does not give this reaction. The salts of strychnia, especially the hydrochlorate or muriate, may be used instead of the pure alkaloid.

Medical properties and uses. — Strychnia is a tonic, a powerful excitant, and an acro-narcotic poison, operating specially upon the motor tract, and in a less degree upon the sensitive tract of the spinal cord. This is demonstrated by the fact that the division of the cord near the occiput, or even decapitation, does not interfere with its operation. In large doses, or in moderate doses long continued, it causes tetanic spasms, and such a rigidity of the respiratory muscles, as to produce fatal asphyxia; a property which has been taken advantage of to restore the nervous energy in paraplegia and partial paralysis, especially that caused by carbonate of lead. Its employment as a remedy in paraplegia was suggested by M. Fouquier, and its efficacy in this and other forms of palsy has been verified by Dr. Bardsley, Majendie, myself, and many others. Owing to the insolubility of strychnia, it is very uncertain in its operation; being either almost inert, or too active, according to the quantity of acid present in the stomach. I have, therefore, found it most efficacious when administered in the form of an acetate, which is readily formed by dissolving gr. j. of the alkali in f ℥ j. of distilled vinegar; so that six minims contain one-tenth of a grain of strychnia, the proper dose to commence with. In some habits I have seen one-sixteenth of a grain produce tetanic twitch-

ings; whilst in others I have given gr. iss. without the smallest obvious effect.[1] As soon as the tetanic twitchings become so severe as to effect the breathing, the medicine should be discontinued; and, after some days, again recommenced in smaller doses, if it be necessary to persist in its use. In very minute doses strychnia operates as a tonic, and has been beneficially employed in pyrosis, passive diarrhœa, and leucorrhœa.

I have employed strychnia sprinkled on blistered surfaces, with advantage, in incipient amaurosis depending on simple atony of the optic nerve, and in partial paralysis: half a grain mixed with grs. ijss. of refined sugar is a proper quantity in such cases. The usual dose of ordinary strychnia is from one-tenth to one-half grain, in any acidulated vehicle. The impure strychnia or that containing much brucia is much less active.

STRYCHNIÆ MURIAS, Dub. *Muriate of Strychnia.*

"Take of strychnia, *one ounce;* dilute muriatic acid, *one fluid ounce,* or *a sufficient quantity;* distilled water, *two ounces and a half.* Pour the acid upon the strychnia, and, adding the water, apply heat until a perfect solution is obtained. Let this cool, and let the crystals which form be dried upon bibulous paper. By evaporating the residual liquid to one-third of its bulk, and then allowing it to cool, an additional quantity of the salt will be obtained."

This salt is a very useful addition to the Dublin Pharmacopœia, the alkaloid itself being so very insoluble. It crystallizes in four-sided needles, and is very soluble in water, much more so than the sulphate.

Dose from $\frac{1}{10}$ grain gradually increased to $\frac{1}{2}$ grain or more, or until symptoms of the action of the alkaloid are developed.

VERATRIA, Edin. *Veratria.*

"Take of any convenient quantity of Cevadilla; pour boiling water over it in a covered vessel, and let it macerate for twenty-four hours; remove the Cevadilla, squeeze it, and dry it thoroughly with a gentle heat. Beat it now in a mortar, and separate the seeds from the capsules by brisk agitation in a deep narrow vessel. Grind the seeds in a coffee-mill, and form them into a thick paste with rectified spirit. Pack this firmly in a percolater, and pass rectified spirit through it till the spirit ceases to be coloured. Concentrate the spirituous solutions by distillation so long as no deposit forms; and pour the residuum, while hot, into twelve times its volume of cold water. Filter through calico, and wash the residuum on the filter so long as the washings precipitate with ammonia. Unite the filtered liquid with the washings, and add

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[1] The administration of such doses is attended, however, with the greatest danger, and fatal effects have thus been induced. ED.

an excess of ammonia. Collect the precipitate on a filter, wash it slightly with cold water, and dry it, first by imbibition with filtering paper and then in the vapour-bath. A small additional quantity may be got by concentrating the filtered ammoniacal fluid, and allowing it cool.

"Veratria thus obtained is not pure, but sufficiently so for medical use. From this coloured substance it may be obtained white, but at considerable loss, by solution in very weak muriatic acid, decolorization with animal charcoal, and re-precipitation with ammonia."

In this process, the steps previously taken for detaching the seeds from their follicles, and enabling them to be readily bruised, are of great importance. The spirit takes up the salt of veratria from the seeds; this spirituous solution is concentrated until little short of allowing a precipitate to fall; then throwing this into water, which dissolves the veratria salt, and separates some resinous and oily matters; the veratria is afterwards thrown down by means of ammonia. Care should be taken not to use water too freely in washing the precipitate. The produce is small. Dr. Christison states that he had not obtained more than one part of pure veratria from one thousand parts of the seeds.[1]

Veratria was discovered by Pelletier and Caventou in 1819. It may be procured from the roots of Veratrum *album.* It was supposed to be the active principle of Colchicum; but, according to Geiger and Hesse, this is an error. These chemists have proved that the alkaloid of Colchicum (*Colchicia*) is distinct from veratria in its solubility, its acrimony, and its poisonous influence.[2]

Couerbe supposes that the Cevadilla contains also another alkaloid, which he has named *sabadillin.*[3] He supposes that the commercial veratria is a compound of pure veratria, sabadillin, resin of veratria, and gum resin of veratria. In order to purify the veratria, the sabadillin and the resin of veratria are dissolved out by boiling water; and the insoluble mixture of veratria and the gum resin being acted on by ether, the veratria is taken up and the gum resin left behind.

Qualities.—Veratria is a whitish, inodorous powder, impressing a bitter, acrid, burning taste on the palate. It is nearly insoluble in water at 60°, and requires for its solution more than 1000 parts of water at 212°. It is readily dissolved in alcohol, in ether, and the weak acids which it neutralizes. It gives an alkaline reaction, and combines with the acids, forming salts which are not easily crystallized. Pure veratria has the composition represented by the formula $C_{34}\ H_{22}\ N\ O_6$.

Medical properties and uses. — This alkali is a powerful topical

[1] More, however, is usually obtained by manufacturers, and in a pure state. Ed.
[2] *Journ. of Phil. Col. of Pharm.* vi. 320.
[3] *Ann. de Chim. et de Phys.* i. 52. p. 368.

excitant. It is difficult to apportion the dose for internal administration, even when dissolved in alcohol; and as its chief influence is as a purgative, I do not perceive any advantage which it possesses over elaterium, which operates nearly in the same manner. It causes also extreme depression of the vascular and nervous systems. As an external application it has been efficaciously employed by Majendie in France, and Dr. Turnbull in this country: but the extravagant eulogies of the latter have not tended to confirm the reputation of the remedy. From six to twelve grains dissolved in f ℥ j. of alcohol as a liniment, or 30 grs. mixed with ʒ j. of olive oil and ℥ j. of lard as an ointment, have been employed in neuralgia and other painful affections, and in gouty and rheumatic paralysis. If it be internally employed, the dose should not exceed one sixteenth of a grain; and the action of even this minute dose should be watched. In large doses, it is a powerful irritant poison.

AQUÆ DISTILLATÆ.

DISTILLED WATERS.

THE volatile oil, on the presence of which the odour and the taste of plants in a considerable degree depend, is elevated during distillation with water; and a portion of it being retained in solution, the water thus acquires the odour and taste of the vegetable with which it is distilled. The qualities, however, thus acquired by water are scarcely, in any case, sufficient to give it much power as a remedy; hence the distilled waters are generally employed merely as elegant vehicles for the exhibition of more active substances.

Waters distilled from aromatic plants are more grateful when the plant is used in the dried state; but when delicate odorous flowers or herbs are employed, and the water acquires little more than odour by the distillation, the vegetable should always, if possible, be used in the recent state. Much care is required, in conducting the process, to prevent any of the vegetable matter from being scorched, and to stop the distillation before the water is tainted by empyreuma. On this account a water-bath, or the vacuum-still, should be used; and when recent vegetable matters, such as leaves or flowers, are used, they should be put into a net and hung in the middle of the still. Notwithstanding, however, every attention which can be given, distilled waters, when newly

prepared, have a very disagreeable empyreumatic odour, to dissipate which the vessels holding the waters must be left open to the air as long as any of the unpleasant odour remains; but afterwards it is essential for the preservation of the waters that they be preserved in closely-corked vessels.

When long kept, many of the distilled waters undergo a species of decomposition: they become slightly sour, and a ropy viscid matter forms in them, owing to the volatile oil which they contain undergoing decomposition. The addition of the spirit is intended to prevent this change from taking place, but it is not adequate to the effect intended; and a much preferable mode is to re-distil the waters, after which they will keep good for several years.

Several of these waters are distilled on a great scale, of a superior quality, and cheaper than any the apothecary can prepare. Substitutes for distilled waters are prepared by rubbing the volatile oils diligently with powdered silex and afterwards with distilled water; this method is now employed by the London College: or, by simply agitating with distilled water, as ordered in the Dublin Pharmacopœia.

AQUA DESTILLATA, Edin. Dub. *Distilled Water.*

Syn. Eau distillée (*F.*), Einfaches distillirtes wasser (*G.*), Gemeenes Destillert Water (*Dutch*), Watten (*Swed.*), Acqua Distillata (*I.*), Agua Distillada (*S.*).

"Take any convenient quantity of spring water; distil it from a proper vessel, rejecting the first twentieth part, and preserving the first half of the remainder."

Dublin.

"Take of spring or river water any convenient quantity: having introduced it into a copper still connected with a block-tin worm, or a Liebig's condenser, draw over about one fortieth by distillation: this being rejected, continue the process until only about one-fifth of the original volume of the water remains in the still. Let the distilled water be preserved in well-stopped bottles."

Water is almost universally diffused over the surface of the earth, but it is not found perfectly pure in any place, which is owing to its great solvent powers enabling it to take up a portion of many substances with which it must come into contact, in its natural state. These impregnations, however, in spring and in river water, are not sufficient to give it any very sensible taste, or to render it unfit for the ordinary purposes of life; but for many pharmaceutical purposes it is necessary that the water be absolutely free from every foreign ingredient. *Rain* and *river water* are the purest kind of natural water, but they nevertheless contain

a portion of carbonic acid gas, and minute quantities of carbonate of lime and of chloride of calcium: in spring water, besides these ingredients, is found a small portion of chloride of sodium; *well water*, which is spring water, obtained from a greater depth, holds in solution a much larger portion of carbonic acid, and several earthy salts, the principle of which are sulphate and carbonate of lime. By distillation, water is freed from these ingredients and rendered nearly pure: but it is tasteless and vapid, owing to the absence of the air which it contains in its natural state. The process should be conducted slowly, with a moderate degree of heat, and not continued longer than the time specified in the formulæ, otherwise a minute portion of the saline matter contained in the natural water passes over in the distillation.

The characters of distilled water are thus given in the London and Edinburgh Pharmacopœias. It is free from colour and odour, and remains limpid on the addition of lime-water, chloride of barium, nitrate of silver, oxalate of ammonia, or hydrosulphuric acid, showing the absence of carbonic acid, sulphates, chlorides, lime-salts, or metallic impurities.

Although the necessity of distilled water for many pharmaceutical operations is very obvious, yet, as it is not always easy for the apothecary to prepare distilled water, *rain water*, filtered through alternate strata of well-washed sand or powdered flints, and charcoal, will often answer every purpose for which distilled water is required. Soft water is a more powerful menstruum of vegetable matter than hard water; and resinous substances cannot easily be mixed with water containing calcareous matter, even when mucilage is used, whereas they readily mix with very soft or distilled water. Perhaps it should be a rule to use filtered rain water only in all pharmaceutical operations. In extemporaneous prescriptions distilled water is often ordered when there is no necessity for its use, and often neglected to be ordered when it is absolutely necessary.

AQUA ANETHI, Lond. Edin. *Dill Water.*

Syn. Eau d'Aneth puant (*F.*), Acqua di Aneto Puzzolente (*I.*).

"Take of dill, bruised, *a pound and a half;* water, *two gallons.* Distil one gallon."

"Take of oil of dill, *two fluid drachms;* powdered silex, *two drachms;* distilled water, *a gallon.* Triturate diligently, first the oil with the silex, then with the water, and strain the solution."

Edinburgh.

"Take of anethum seeds, bruised, *eighteen ounces;* rectified

spirit, *three fluid ounces;* water, *two gallons.* Mix together, and distil off one gallon."

The use of the silex in the second process of the London College is to cause the minute mechanical division of the oil, by a medium which is unacted upon itself.

This water has an unpleasant odour and little pungency. It is used principally as a carminative for infants; and is a good vehicle for giving magnesia and rhubarb to these tender patients.

AQUA ANISI, Dub. *Aniseed Water.*

"Take of essence of anise, *one fluid ounce;* distilled water, *half a gallon.* Mix with agitation, and filter through paper. A carminative for childıen, as dill water."

AQUA CARUI, Lond. Dub. *Carraway Water.*

Syn. Eau de Carvi (*F.*), Feldkumel wasser (*G.*), Acqua di Carv (*I.*).

"It is prepared in the same manner as dill water."

Dublin.

"Take of essence of carraway, *one fluid ounce;* distilled water, *half a gallon.* Mix with agitation, and filter through paper."

Carraway water possesses a considerable aromatic flavour and pungency, and may be used for the same purposes as dill water.

AQUA CINNAMOMI, Lond. Edin. Dub. *Cinnamon Water.*

Syn. Eau de Cannelle (*F.*), Zimmt wasser (*G.*), Acqua di Cinamomo (*I.*).

"To be prepared in the same manner as has been directed for dill water."

Edinburgh.

"Take of cinnamon, bruised, *eighteen ounces;* water, *two gallons;* rectified spirit, *three fluid ounces.* Mix them, and distil off one gallon."

Dublin.

"Take of essence of cinnamon, *one fluid ounce;* distilled water, *half a gallon.* Mix with agitation, and filter through paper."

This water has the agreeable flavour and pungency of the cinnamon, without its astringency. It is a gentle stimulant: it is chiefly used to cover the nauseous taste of other medicines.

AQUA CASSIÆ, Edin. *Water of Cassia Bark.*

Syn. Eau de Casse (*F.*), Acqua di Cannella (*I.*).

"Take of cassia bark, bruised, *eighteen ounces;* water, *two gallons;* rectified spirit, *three fluid ounces.* Mix them together, and distil off one gallon."

This is often substituted for cinnamon water, being less expensive; but it is also less agreeable.

AQUA FŒNICULI, Edin. Dub. *Fennel Water.*

Syn. Eau de Fenouil (*F.*), Fenchel wasser (*G.*), Acqua di Finnocchio (*I.*).

"It is prepared in the same manner as dill water."

Dublin.

"Take of essence of fennel, *one fluid ounce;* distilled water, *half a gallon.* Mix with agitation, and filter through paper."

It is rarely employed.

AQUA LAURO-CERASI, Edin. Dub. *Laurel Water.*

"Take of the fresh leaves of the cherry-laurel, *one pound;* water, *two pints and a half;* compound spirit of lavender, *an ounce.* Chop down the leaves; mix them with the water. Distil off one pint; agitate the distilled liquid well, filter it if any milkiness remain after a few seconds of rest, and then add the spirit of lavender."

Dublin.

"Take of fresh leaves of the common laurel, *one pound;* water, *two pints and a half.* Upon the leaves, chopped, and crushed in a mortar, macerate the water for twenty-four hours, and then draw over a pint of liquid by distillation, using a Liebig's condenser, and chloride of zinc bath. Filter the product through paper, and preserve it in a well-stopped bottle."

This is a weak solution of hydrocyanic acid in water, aromatized with the lavender in the Edinburgh preparation. It ought to be used with caution; f ℥ j. of it has proved fatal; and its variable strength is a great objection to its use. The dose is ♏ x. to ♏ xx.

AQUA MENTHÆ PIPERITÆ, Lond. Edin. Dub. *Peppermint Water.*

Syn. Eau de Menthe poivrée (*F.*), Pfeffermünz wasser (*G.*), Acqua di Menta piperitide (*I.*).

"Take of dried peppermint, *two pounds;* water, *two gallons.* Let a gallon distil. If the fresh herb be employed, double the weight must be used."

"This water may be more quickly prepared from the oil of peppermint, in the same manner as the dill water."

Edinburgh.

"Take of peppermint, *four pounds* if fresh; *two pounds* if dry; water, *two gallons;* rectified spirit, *three fluid ounces.* Mix them, and distil off one gallon."

Dublin.

"Take of essence of peppermint, *one fluid ounce;* distilled water, *half a gallon.* Mix with agitation, and filter through paper."

Peppermint water has the flavour and taste of the plant in a considerable degree. It is sometimes used alone as a carminative, but more generally for the purpose of covering the taste of other medicines. The dose is f℥j. to f℥iv.

AQUA MENTHÆ VIRIDIS, Lond. Edin. Dub. *Spearmint Water.*

It is prepared in the same manner as above, according to the three Pharmacopœias; and used for the same purposes.

AQUA MENTHÆ PULEGII, Dub. *Pennyroyal Water.*

"Take of essence of pennyroyal, *one fluid ounce;* distilled water, *half a gallon.* Mix with agitation, and filter through paper." See *Aqua Pulegii.*

AQUA PIMENTÆ, Lond. Edin. Dub. *Pimenta Water.*

Syn. Eau de Poivre de Jamaique (*F.*), Nelherpfeffer wasser (*G.*), Acqua di Pimenti (*I.*).

"Take of pimento, bruised, *a pound;* water, *two gallons.* Distil off a gallon."

"This water may be more quickly prepared from oil of pimento, in the same manner as has been directed for dill water."

Edinburgh.

"Take of pimento, bruised, *one pound;* water, *two gallons;* rectified spirit, *three fluid ounces.* Mix them, and distil off one gallon."

Dublin.

"Take of essence of pimento, *one fluid ounce;* distilled water, *half a gallon.* Mix with agitation, and filter through paper."

This water has the odour and aromatic quality of the Jamaica pepper, but is not very agreeable to the taste. It is used as a carminative in dyspepsia. The dose is f ℥ j. to f ℥ iv.

AQUA PULEGII, Lond. Edin. *Pennyroyal Water.* Called AQUA MENTHA PULEGII in Dublin Pharmacopœia.

Syn. Eau de Menthe peuliot (*F.*), Poley wasser (*G.*), Acqua di Puleggio (*I.*).

It is prepared in the same manner as the other mint waters.

Pennyroyal water has the flavour and taste of the green herb. It is used for the same purposes as peppermint water. The dose is f ℥ j. to f ℥ iij.

AQUA ROSÆ, Lond. Edin. Dub. *Rose Water.*

Syn. Eau des Roses (*F.*), Rosen wasser (*G.*), Acqua di Rose (*I.*), Agua rosada (*S.*).

"Take of centifolia, or damask rose leaves, *ten pounds* (rectified spirit, *three fluid ounces*, E.). The Edinburgh College adds that 'the petals should be preferred when fresh; but it also answers well to use those which have been preserved by beating them with twice their weight of muriate of soda:' water, *two gallons.* Distil a gallon."

Dublin.

"Take of essential oil of roses, *twenty minims;* distilled water, *half a gallon.* Mix with agitation, and filter through paper."

This water has the agreeable odour of the rose in great perfection when properly prepared; which, however, is seldom the case, except when it is made on a large scale. It is very apt to spoil, unless it be rectified by a second distillation: but spirit of wine ought not to be added to rose water.

As rose water is perfectly free from any acrimony, and, except in point of odour, does not differ from simple distilled water, it is very generally employed in collyria, with acetate and diacetate of lead, and acetate and sulphate of zinc.[1]

AQUA SAMBUCI, Lond. Edin. *Elder Water.*

"Take of fresh elder flowers, *ten pounds* (rectified spirit, *three fluid ounces*, E.); water, *two gallons.* Mix them, and distil off one gallon."

Sometimes used in collyria.

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[1] Rose water was first made in Persia; and the Persian rose water was long the most celebrated for its excellence.

PREPARATUM E CARBONE.

PREPARATION OF CARBON.

CARBO ANIMALIS PURIFICATUS, Edin. Dub. *Purified Animal Charcoal.*

"Take of ivory-black, *one pound*; muriatic acid (commercial) and water, of each, *twelve fluid ounces.* Mix the acid and water; add gradually the ivory-black, stirring occasionally. Digest with a gentle heat for two days, agitating from time to time. Then boil. Dilute with two pints of water; collect the undissolved charcoal on a filter of calico or linen, and wash it with water till what passes through scarcely precipitates with solution of carbonate of soda. Heat the charcoal, first moderately, and then to redness, in a closely covered crucible."

Dublin.

"Take of ivory-black, *five pounds*; muriatic acid of commerce, *three pints*; water, *three gallons and three pints*; distilled water, as much as is necessary. To the acid, diluted with three pints of water, gradually add the ivory-black, and digest with repeated stirring, at a gentle heat, for twenty-four hours. Pour on now a gallon of water, and when, after the mixture has been well agitated, the insoluble matters have subsided, remove the clear solution by decantation or the syphon. Let this be done a second and a third time. Place now the black sediment on a calico filter, and wash it with distilled water until the washings cease to give a precipitate with nitrate of silver. Finally, let the product be dried in a stove or oven, a gentle heat being at first applied, which must be finally raised to between 300° and 400°."

This preparation is now omitted from the London Pharmacopœia, and charcoal obtained from bullock's blood placed in the list of the *Materia Medica.*

The processes of the Edinburgh and Dublin Colleges, given above, resemble each other very closely. By means of dilute muriatic (hydrochloric) acid and water, aided by heat, the earthy salts which common ivory-black contains in such abundance are dissolved out, and the carbon is then left in a pure state. The methods of ascertaining whether the carbon has been sufficiently purified and washed differ. The Edinburgh College employs *carbonate of soda*, to precipitate any phosphate of lime, if present; the Dublin, *nitrate of silver*, to detect the presence of any muriatic acid.

Qualities. — Purified animal charcoal occurs as a black or brownish-black powder, light, without either odour or taste. It

should yield nothing to hydrochloric acid when digested with that fluid, showing the absence of earthy salts; and according to the Edinburgh College, " when incinerated with its own volume of red oxide of mercury, it is dissipated, leaving only a scanty ash." The most remarkable property possessed by animal charcoal is power of absorbing principles: these may be either animal, vegetable, or mineral. It possesses in a very exalted degree all the antiseptic properties of wood-charcoal, and its powers of absorbing gaseous matters, colouring matters, &c. When added to a vegetable infusion containing any bitter principle, it will be found that the bitterness is entirely removed, provided the charcoal has been employed in sufficient quantities (as first shown by Mr. R. Warrington); and it matters not whether this bitterness depends on the presence of a neutral principle, as quassine, colocynthine, gentianine, or of any alkaloid, as morphia, brucia, strychnia, &c.; it appears also to have the power of taking up acids, as tannic and gallic acids, also resinous acids: certain metallic salts are likewise absorbed by it, as those of lead, &c.: so great is its property of abstracting substances from solution, that its use has been proposed as a means of separating certain principles, as alkaloids, from the other matters with which they are united in the natural state.

Medical and pharmaceutical properties and uses. — Animal charcoal in its impure, or, still better, in its purified state, may be employed in medicine and pharmacy. When given internally, it has the power of correcting the fœtor of the breath and dejections, in diseases of different portions of the alimentary canal, and also of relieving flatulence and heartburn. It has also been proposed by the Editor as an antidote especially to organic poisons[1]: and if there is any advantage in having direct antidotes to these substances, undoubtedly this drug possesses the property in a much higher degree than any other body. In some cases as little as half an ounce of the antidote was found sufficient, when given to dogs, completely to neutralise the poisonous effects of doses of poisons sufficient to destroy thirty or forty of these animals. Some writers, on speculative grounds only, have been inclined to regard its action as simply mechanical: but to show how completely erroneous this idea is, it is only necessary to state, that wood-charcoal given under like circumstances produced no antidotal effect. Dr. B. H. Rand, of Philadelphia, has fully confirmed the accuracy of the editor's experiments, as to the power of purified animal charcoal acting as an antidote to vegetable substances. Externally, this charcoal may be employed as a dentifrice, and also as an application to fœtid ulcers, in the form of a cataplasm, or sprinkled on the parts. Dose, internally administered, ℈j. to ʒij.

[1] Transactions of the Medical Society of London.

CATAPLASMATA.

CATAPLASMS.

CATAPLASMS are in general extemporaneous preparations; but the following formulæ are introduced into the London Pharmacopœia, to fix the proportions of the ingredients.

CATAPLASMA CARBONIS, Lond. *Charcoal Cataplasm.*

"Take of boiling water, *ten fluid ounces;* bread, *two ounces;* powdered linseed, *ten drachms;* powdered charcoal, *three drachms.* Macerate the bread in a little water near the fire, then mix it, and add the linseed by degrees, stirring the ingredients, that a soft cataplasm may be formed. To this mix in two drachms of the charcoal, and sprinkle on the surface what remains."

Recently prepared charcoal has the property of destroying fœtid odours, but it loses much of this if it be allowed to cool in the open air. Such a poultice has been found highly beneficial in fœtid and gangrenous sores. It should be renewed several times in twenty-four hours.

CATAPLASMA CONII, Lond. *Cataplasm of Hemlock.*

"Take of boiling water, *ten fluid ounces;* powdered linseed, *four ounces and a half,* or as much as may be necessary; extract of conium, *an ounce.* To the water add by degrees the linseed, constantly stirring, that a cataplasm may be formed. On this spread the extract, first softened in water."

A useful application for allaying pain in irritable, strumous, syphilitic, and cancerous sores.

CATAPLASMA FERMENTI, Lond. *Yeast Cataplasm.*

"Take of beer yeast and water, heated to one-hundred degrees, each, *five fluid ounces;* flour, *a pound.* Mix the yeast with the water; and the flour being added, stir it until a cataplasm be made. Place it near the fire until it rises."

The rising is produced by the extrication of carbonic acid gas, on which the efficacy of the cataplasm depends; and which is evolved by the heat applied to the mixture exciting the fermentative process. In this state it is applied to painful gangrenous, or foul ulcers; and soon corrects the fœtor of the discharge, while at the same time it hastens the sloughing.

CATAPLASMA LINI, Lond. *Cataplasm of Linseed.*

"Take of boiling water, *ten fluid ounces;* powdered linseed, *four*

ounces and a half, or as much as may be necessary. Constantly stirring, add by degrees the linseed to the water, that a cataplasm may be formed."

An excellent emollient poultice: it should be frequently renewed.

CATAPLASMA SINAPIS, Lond. *Cataplasm of Mustard.*

"Take of boiling water, *ten fluid ounces;* powdered linseed, powdered mustard, of each, *two ounces and a half,* or as much as may be necessary. By degrees add the powders, first well mixed, to the water. Keep stirring, that a cataplasm may be formed."

This cataplasm is intended to be a powerful local stimulant and rubefacient: but the boiling water lessens the acrimony of the flour of mustard; and consequently tepid water should be employed. The mustard cataplasm, made with tepid water, should be spread on cloths to the thickness of about half an inch, and left on till it excites redness without causing vesication. It is a valuable counter-irritant and excitant in inflammatory affections where an instantaneous local irritation is required. It is applied to the soles of the feet in the low stage of typhus fever, particularly when stupor or delirium is present; and in apoplexy, coma, and other cases in which there is a great determination to the head, as well as in deep-seated inflammatory pains. Its rubefacient effects are very quickly produced, and often so powerfully as to raise a blister on the part; but it should be taken off before this is produced.

CATAPLASMA SODÆ CHLORINATÆ, Lond. *Cataplasm of Chlorinated Soda.*

"Take of boiling water, *six fluid ounces;* powdered linseed, *four ounces and a half;* solution of chlorinated soda, *two fluid ounces.* Constantly stirring, add by degrees the linseed to the water; then mix in the chlorinated soda."

This application is useful to foul ulcers to correct the fœtid discharges: its value depends on the slow extrication of chlorine from the chlorinated soda.

CERATA.

CERATES.

THESE are unctuous compositions, possessing a certain degree of firmness, intermediate between that of plasters and that of ointments. Their consistence depends on the wax they contain; and from it they derive their generic appellation. The most important circumstance to be attended to in their preparation is the freshness of the fat and the oils employed; and their preservation in this state.

CERATUM, Lond. *Cerate.*

"Take of olive oil, *a pint;* wax, *twenty ounces.* Add the oil to the melted wax, and mix."

Syn. Cérat simple (*F.*), Cerotto semplice (*I.*).

This is a useful simple emollient dressing to excoriations and sores.

CERATUM CALAMINÆ, Lond. Edin. *Calamine Cerate.*

"Take of prepared calamine and wax, of each, *seven ounces and a half;* olive oil, *a pint.* Mix the oil with the melted wax; then remove them from the fire; and when they first begin to thicken, add the calamine, stirring constantly until they cool."

Edinburgh.

"Take of calamine, prepared in the same way as prepared chalk, *one part;* simple cerate, *five parts.* Mix them well together."

These preparations are very useful dressings to excoriations and ulcers; and as they are in some degree desiccative, they are also applied to burns after the inflammation is abated; and to the eyelids in ophthalmia tarsi, and to sore nipples. They have been long known in practice under the name of *Turner's Cerate.*

CERATUM CANTHARIDIS, Lond. *Cerate of Blistering Flies.*

"Take of cantharides rubbed into fine powder, *an ounce;* spermaceti cerate, *six ounces.* Add the cantharides to the cerate, softened by heat, and mix."

Syn. Cérat de Cantharides (*F.*), Cerotto di Cantarille (*I.*).

This cerate is intended to promote a purulent discharge from a blistering surface, without occasioning much irritation. In some

habits, however, it causes strangury, great pain of the part, swelling of the lymphatics, and so much general irritation as to produce œdematose swellings and erysipelas of the neighbouring parts.[1]

It is preferable to spread cerates or ointments, intended to keep open issues, on lint; and the dressings should in all cases be exactly of the same size, and renewed once in twenty-four hours.

CERATUM CETACEI, Lond. *Spermaceti Cerate.*

"Take of spermaceti, *two ounces;* white wax, *eight ounces;* olive oil, *a pint.* Add the oil to the spermaceti and the wax melted together, and stir them with a spatula until they cool."

CERATUM SIMPLEX, Edin. *Simple Cerate.*

"Take of olive oil, *six parts;* white wax, *three parts;* spermaceti, *one part.* Heat the oil gently; add the wax and spermaceti; stir the whole briskly when it is fluid, and continue the agitation as it cools."

Syn. Cérat de blanc de baleine (*F.*), Cerotto di Spermaceti (*I.*).

These are soft cooling dressings.

CERATUM HYDRARGYRI COMPOSITUM, Lond. *Compound Cerate of Mercury.*

"Take of ointment of mercury and compound soap cerate, of each, *six ounces;* camphor, *an ounce and a half.* Rub them together."

This cerate is well adapted to excite action in indolent tumours, and as a resolvent in enlarged joints.

CERATUM PLUMBI ACETATIS, Lond. *Cerate of Acetate of Lead.*

"Take of acetate of lead, in powder, *five drachms;* white wax, *five ounces;* olive oil, *a pint.* Melt the wax in eighteen fluid ounces of the oil: to these add, gradually, the acetate of lead, separately rubbed down with the remaining oil, and stir with a spatula until they unite."

This is an excellent cooling cerate for burns, excoriations, and other inflamed sores.

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[1] In one case, which came under my observation, a blister on the scalp was dressed for four days with this cerate. On the fourth day the head swelled to an alarming size; and an œdematose erysipelas covered the scalp and face, and shut up the eyes; accompanied with a great degree of fever. On removing the acrid dressings, and employing emollient fomentations, with dressings of cetaceous ointment, these alarming symptoms soon subsided.

CERATUM PLUMBI COMPOSITUM, Lond. *Compound Cerate of Lead.*[1]

"Take of solution of diacetate of lead, *six fluid ounces;* wax, *eight ounces;* olive oil, *a pint;* camphor, *a drachm.* Melt the wax and mix it with sixteen fluid ounces of the oil; then remove them from the fire, and when they begin to thicken, add gradually the solution of acetate of lead, and stir assiduously with a spatula till they be cold. Finally, mix with these the camphor dissolved in the remainder of the oil."

This composition is similar to what was recommended by Goulard, as a mode of applying lead in the form of ointment, and long known under the name of *Goulard's Cerate.* It is applicable to the same cases as the former cerate.

CERATUM RESINÆ, Lond. *Resin Cerate.*

"Take of resin and wax, each, *fifteen ounces;* oil of olive, *a pint.* Melt the resin and the wax together by a slow fire, then add the oil, and press the cerate while hot through a linen cloth."

Syn. Cérat Résineux (*F.*), Harzzerat (*G.*), Cerotto Resinoso (*I.*).

This cerate is stimulant and cleansing; and therefore forms an excellent dressing for foul and indolent ulcers.

CERATUM SABINÆ, Edin. *Cerate of Savine.*

"Take of fresh savine, *two parts;* bees' wax, *one part;* axunge, *four parts.* Melt the wax and axunge together; add the savine, and boil them together till the leaves are friable; then strain."

The preparation of this cerate is exceedingly difficult, as the acrid principle of the savine, on which its efficacy depends, is much injured by long boiling, or by too high a temperature. It would be better to express the acrid juice from the fresh leaves, and mix it with the cerate when it begins to thicken by cooling. The cerate, when good, has a beautiful deep green colour, and the odour of the fresh-bruised herb. It should be kept in closely-covered pots, as it soon loses its virtue by exposure to the air.

Savine ointment, which was first described by Mr. Crowther[2], is well calculated for keeping up a purulent discharge from a blistered surface; which it does as effectually, and with much less irritation, than the ointment of cantharides. A white coat is apt to form on the discharging surface, and must be removed occasionally, so as to allow the cerate to be applied to the sore.

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[1] This name is improper. It ought to have been *ceratum plumbidia cetatis comp.;* the virtue of the composition depending on the diacetate of lead, not on lead.

[2] *Observations on White Swelling.*

CERATUM SAPONIS COMPOSITUM, Lond. *Cerate of Soap.*

"Take of soap, *ten ounces;* wax, *twelve ounces and a half;* oxide of lead, powdered, *fifteen ounces;* olive oil, *a pint;* vinegar, *a gallon.* Boil the vinegar with the oxide of lead over a slow fire, stirring diligently until they incorporate; then add the soap, and boil again in a similar manner, until the moisture be entirely evaporated; lastly, mix the wax, previously melted with the oil."

The efficacy of this cerate evidently depends on the acetate of lead which is formed in the first stage of the process, the soap answering scarcely any other purpose than to give consistence and adhesiveness. It is occasionally used as a cooling dressing.

PREPARATA E CHLORINIO.

PREPARATIONS OF CHLORINE.

AQUA LIQUOR CHLORINII. Lond. (Appendix). Edin. Dub. *Chlorine Water.* (Freshly prepared, L).

"Take of hydrochloric acid, *a fluid ounce;* binoxide of manganese, powdered, *two drachms;* distilled water, *half a pint.* Mix the acid and binoxide in a retort; then pass the chlorine into the water until it almost ceases to be evolved."

Edinburgh.

"Take of muriate of soda, *sixty grains;* commercial sulphuric acid, *two fluid drachms;* red oxide of lead, *three hundred and fifty grains;* water, *eight fluid ounces.* Triturate the muriate of soda and oxide together; put them into the water contained in a bottle with a glass stopper: add the acid; agitate occasionally till the red oxide becomes almost all white; allow the insoluble matter to subside before using the liquid."

Dublin.

"Take of peroxide of manganese, in fine powder, *half an ounce;* muriatic acid of commerce, *three fluid ounces;* distilled water, *twenty-four ounces.* Introduce the peroxide of manganese into a gas bottle, and having poured upon it the muriatic acid, diluted with two ounces of water, apply a gentle heat, and by suitable tubes cause the gas as it is developed to bubble through two additional ounces of the water, placed in an intermediate small phial, and then to pass to the bottom of a three pint bottle, containing

the remainder of the water, and whose mouth is loosely plugged with tow. When the air has been entirely displaced by the chlorine, let the bottle be disconnected from the apparatus in which the gas is generated, corked loosely, and shaken until the chlorine is absorbed. It should now be transferred to a pint bottle with a well-ground glass stopper, and preserved in a cool and dark place."

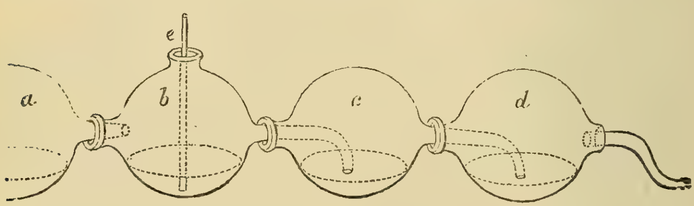
In the London and Dublin processes the chlorine is evolved from the hydrochloric or muriatic acid by the action of the peroxide of manganese; and we must suppose that 2 equivalents of the acid acting upon 1 equivalent of the peroxide gives rise to 1 equivalent of chloride of manganese, 2 equivalents of water, and 1 equivalent of chlorine, which passes over, and is condensed in the water contained in the receivers: the decomposition may be thus represented $Mn\ O_2 + 2\ H\ Cl = Mn\ Cl + 2\ HO + Cl$. In the Dublin process the chlorine is first washed in a little water, then passed into a large bottle only one-third filled with the water; and after the chlorine has passed into the water and displaced the air, agitation is employed to cause the gas to combine with the water.

In the Edinburgh process the sodium of the chloride of soda is oxidized at the expense of the red lead, and being converted into soda, this combines with a portion of the sulphuric acid, and forms sulphate of soda, which is held in solution; whilst the red lead reduced to the state of protoxide combines with another portion of the acid, and a sulphate of lead is precipitated. During these processes the chlorine of the chloride being set free is dissolved and retained in the solution with the sulphate of soda, which being in small quantity does not interfere with the medicinal properties of the chlorine.

Chlorine water must be kept in well-stopped glass vessels, in an obscure place.

Syn. Chlore liquide (*F.*), Wasserigos Chlor (*G.*), Chloro liquido (*I.*).

In the process, by which this solution is often prepared, chlorine comes over in the gaseous form, and is washed in the distilled water, which is placed in a Woolfe's bottle, or a globular vessel, *a*, con-



nected with a retort containing the mixture that furnishes the

chlorine. The gas, as it passes through the water, in part condenses and combines with it, while the uncondensed portion passes on to the other vessels, *b*, *c*, *d*, and there combines with the water, forming this solution, which is a simple solution of chlorine. The safety-tube *e* prevents any explosion from the too rapid extrication of the gas. The last receiver should contain a mixture of quicklime in water, to absorb all the superfluous gas.

Chlorine was discovered by Scheele in 1774, while making his experiments on manganese; and was termed by him *dephlogisticated marine acid;* but its nature was not perfectly understood until it was investigated by Sir H. Davy, who discovered that it is an elementary substance, and named it *chlorine*[1], from its colour, which is yellowish green. Its equivalent is 35·50. Cold water absorbs twice its weight of chlorine. When moist chlorine is exposed to a temperature of 32°, yellow crystals are formed.

Qualities. — The saturated aqueous solution of chlorine has a peculiar, suffocating odour; and a harsh, styptic, but not acid taste. Its colour is a very pale yellowish green: it destroys all the vegetable colours, rendering them white. It must be kept in opaque bottles, or in a dark place: for by the action of the solar rays part of the water is decomposed; the hydrogen of which, uniting with the chlorine, forms hydrochloric acid, which remains in solution in the water, while the oxygen is set free. At a temperature of 50° this solution contains about twice its volume of chlorine. The aqueous solution of *chlorine* acts on almost all the metals, forming chlorides. Liquor Chlorinii is introduced in the London Appendix as a test; its use as such will be described in the Pharmacopœia Appendix.

Medical properties and uses. — *Aqueous solution of chlorine* is stimulant and antiseptic. In large doses it irritates and inflames the alimentary canal; but when sufficiently diluted, its salutary influence is very obvious. It has been strongly recommended in scarlatina and malignant sore throat; and as an antisyphilitic remedy. In the latter disease the same opinion may be given of it as of the simple hydrochloric acid; but in scarlatina and cynanche maligna more benefit has resulted from its use. From f ʒ ss. to f ʒ ij., mixed in f ℥ viij. of water, and sweetened with a little syrup, may be taken in the course of the day, in divided doses. A drachm of the solution put into a bottle for inhaling gas, and six fluid ounces of tepid water added, the chlorine is slowly extricated, and may be thus inhaled, in conjunction with the aqueous vapour, in the latter stages of phthisis. It aids expectoration, and corrects the fœtor of the sputa.

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[1] From χλωρος, *green.*

But the most important use of chlorine is, in its gaseous form, as a fumigation for neutralizing putrid miasmata, and correcting the infectious atmosphere of hospital wards and rooms in which have been cases of contagious fevers. For these purposes it is better adapted than the common hydrochloric acid gas; but as both are highly deleterious to animal life, they should be employed in such apartments only as the sick can be removed from while the gas is extricated. The chlorine is easily procured by pouring f ʒ vj. of strong sulphuric acid on a mixture of ʒ iv. of pulverized binoxide of manganese, and ʒ viij. of dried common salt, in a china cup, which should be placed in a pipkin of hot sand. The doors of the room which is to be fumigated must be kept shut for two hours after the cup or cups with this charge are placed in it; then be thrown open and a free current of air permitted to pass through the apartment. By this process the offensive odour of the sick room is destroyed, the chemical constitution of the deleterious atmosphere is altered, and its freshness completely restored.

For the more convenient application of this powerful agent, Morveau has invented what he terms a disinfecting or preservative bottle. The apparatus consists of a strong glass bottle or phial, covered with a plate of glass, which is fitted by grinding so as to shut, accurately, the orifice of the vessel. The bottle is fixed in a wooden frame; and the plate of glass kept in its place, and closely applied by means of a screw. If the bottle be of 25 cubic inches of capacity, the charge to be put into it may consist of 372 grs. of binoxide of manganese in coarse powder, 3·5 cubic inches of nitric acid of 1·4 specific gravity, and an equal bulk of hydrochloric acid of 1·134. As soon as the charge is introduced, the glass plate must be firmly screwed down in its place. When the apparatus is to be used, the screw is to be turned so as to allow the gas which is extricated to escape from under the plate of glass; and this must be again screwed down as soon as the smell of the chlorine is perceptible in the distant corners of the apartment. Bottles of any dimensions may be used, but the charge must in no case occupy more than one-third part of the capacity of the vessel.

CHLOROFORMYL, Lond. CHLOROFORMUM, Dub.
Chloroform, Terchloride of Formyle.

"Take of chlorinated lime, *four pounds;* rectified spirit, *half a pint;* water, *ten pints;* chloride of calcium, broken into fragments, *a drachm.* Put the lime, previously mixed with the water, into a retort, and to these add the spirit, so that the mixture shall fill as much as one-third part of the retort; then heat in a sand-bath, and when ebullition first begins, immediately withdraw the fire, lest the retort should be broken by the suddenly-increased heat.

Let the liquor distil until there is nothing more which subsides: the fire being restored, if it should be at any time required. To the distilled liquor add four times as much water, and shake all well together. Carefully separate the heavier portion which shall subside, and to it add the chloride, and agitate occasionally for an hour. Lastly, again distil the liquid from a glass retort into a glass receiver."

Dublin.

"Take of chlorinated lime, *ten pounds;* fresh-burned lime, *five pounds;* water, *four gallons;* rectified spirit, *twenty-five ounces;* peroxide of manganese, in fine powder, *two drachms.* Slake the lime with a quart of the water, first raised to the boiling temperature, and having placed the slaked lime, and the chlorinated lime in a sheet-iron or copper still, pour on the residue of the water, first mixed with the spirit, and raised to the temperature of 100°. Connect now the still with a condenser, and apply heat, which, however, must be withdrawn the moment the distillation commences. The distilled product, the bulk of which need not exceed a quart, will occur in two strata, the lower of which is the crude chloroform. Let this be agitated twice in succession, with an equal volume of distilled water, and then in a separate bottle with half its volume of pure sulphuric acid. Lastly, let it be shaken in a mattress with the peroxide of manganese, and rectified from off this at a very gentle heat. The specific gravity of chloroform is 1496. The lighter liquid, which distils over with the chloroform, and the water used in washing the latter, should be preserved with the view of their being introduced, with a new charge, into the still in a subsequent process."

Chloroform is a product which results from many reactions; for example, when sugar or starch, peroxide of manganese, and hydrochloric acid react on each other, and so when potash acts upon a body named chloral: but it is more advantageously prepared by the action of chlorine upon alcohol, pyroxylic or wood-spirit, or upon pyroligneous spirit or acetone: it is, however, found that the purest product is most readily obtained by the use of alcohol, and some body containing chlorine, either in a free state or very weakly combined, as occurs in the chlorinated lime, or, as it is sometimes called, chloride or hypochlorite of lime; these substances are therefore made use of both in the processes of the London and Dublin Colleges. The reactions which occur between the chlorinated lime and alcohol, when gentle heat is applied, are by no means well understood; but we know that the principal product is *chloroform;* and any attempt at elucidating the process by diagrams, in the present state of our knowledge, would not be attended with any advantage. It will be observed, that the two

processes above given differ in certain particulars. The London College orders the product to be first washed with water, to remove any alcohol, and afterwards agitated and distilled off chloride of calcium, for the purpose of separating any adhering water. The Dublin College makes use of slaked lime in addition to the chlorinated lime in the first distillation, probably to prevent the formation of a chlorinated pyrogenous oil, which is apt to be formed in considerable quantities; and, again, after washing the first distillation with water, they make use of sulphuric acid, to separate any oily products which may pass over, and also the adherent water; and, lastly, they agitate and distil with peroxide of manganese, to remove the sulphurous acid left after the action of the oil of vitriol. It has been found that when sulphuric acid is made use of in the purification of the chloroform, that this body is very apt to undergo decomposition with the formation of hydrochloric acid and free chlorine; but it is stated that if, after the action of the vitriol, the chloroform is distilled with carbonate of baryta, the product is as stable as that prepared by the other process.

Qualities. — Pure chloroform is a limpid, colourless, oily-looking liquid, very volatile, of a peculiar agreeable fruity, ethereal odour, and sweet cool taste; much heavier than water, its specific gravity being about 1·48. It is very slightly soluble in water, but dissolves in alcohol and ether; not inflammable, or with difficulty made to burn; boils at 141° Fahr. It is a very powerful solvent, dissolving caoutchouc, gutta percha, amber, copal, and other resinous substances, also wax, camphor, fats, iodine, bromine, many alkaloids, gum, cotton, &c. Its power of dissolving these latter bodies has been made use of by M. Rabourdin, in separating some of them from the juices of plants in which they are contained. It has no action upon nitrate of silver, but nitric and sulphuric acid both slowly decompose it; alkalies in the cold do not alter it quickly.

Chloroform may be represented as a terchloride of Formyle (C_2H), and contains therefore 2 equivalents of carbon, 1 eq. of hydrogen, and 3 eq. of chlorine. Its composition is represented by the formula C_2HCl_3; it is therefore formic acid (C_2HO_3), in which the 3 eq. of oxygen have been replaced by 3 eq. of chlorine; and by the action of an alcoholic solution of potash it is resolved into formiate of potash and chloride of potassium; a change which may be thus represented: $C_2HCl_3 + 4KO = C_2HO_3, KO + 3KCl$.

The presence of free hydrochloric acid or chlorine can be detected by the action of these bodies on the nitrate of silver, and also by their acid reaction of the former, and the bleaching property of the latter. The presence of oily matters is shown by the chloroform communicating a dark colour to pure sulphuric acid, and also by being left after the evaporation of the chloroform, when they can be easily distinguished by their offensive odour, which is very

different from that of the pure chloroform. The following are the characters of chloroform as stated by the London College: — "Free from colour, with a grateful odour: its specific gravity is not less than 1·48. It is scarcely dissolved by water; it does not colour litmus red; when rubbed on the skin it quickly evaporates, scarcely any odour being left."

Medical properties and uses. — When taken internally, it appears to act as a narcotic and antispasmodic, not unlike ether, its sedative effects, however, being more distinctly marked, and Dr. Hartshorne found that, on his own person, seventy-five drops produced a general diminution of sensorial power, with drowsiness, and without exhilaration or acceleration of the pulse.[1] It has been employed, given in this form, in spasmodic affections, as spasmodic coughs, asthma, cholera, lead colic, and hysteria; it has also been stated by Mr. Tuson to act as a valuable sedative in cancerous affections, and by Dr. Wood and others to be useful in neuralgia and other painful affections; and, lastly, it has been asserted to be a powerful antiperiodic by Dr. Delioux of Rochefort, relieving sometimes when bark or quinine has failed. Externally, it has also been used in medicine for the purpose of allaying pain and irritation in neuralgia, and certain skin affections attended with troublesome itching. For these purposes, however, its application has been very limited, and it is chiefly employed in the form of vapour, for the production of its anæsthetic effects. When inhaled in small doses, it produces a slight species of inebriation, with some impairment of vision and common sensibility, consciousness remaining. The sensations produced by these small doses are usually of a pleasurable character; carried to this extent, it may be employed in treatment of spasmodic and neuralgic affections. If the inhalation is still continued, the patient passes into a dreamy state, sometimes with considerable mental excitement, but with loss of consciousness and common sensibility: it may be carried to this extent when employed in natural labour: from these conditions the patient soon recovers on the cessation of the administration of the vapour. If the inhalation is carried still further, the patient loses the power of voluntary motion; there is an inclination of the eyes upwards, complete suspension of mental faculties, with slight contraction of muscles and rigidity of limbs. Although at this stage common sensibility appears quite destroyed, yet on the performance of surgical operations there may be indications in features expressive of pain, and even moaning and inarticulate cries. When this condition has been kept up for some time, and the winking of the eyelids very much diminished, then is the proper period for the performance of surgical operations. If the effects are carried

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[1] Wood and Bache, *United States Dispensatory.*

further, complete relaxation of voluntary muscles takes place, but the sphincta remain contracted, the respiration goes on, though accompanied with slight stertorous breathing, the glottis continues sensible, but the sensibility of the pharynx appears to be diminished, so that in operations about the mouth blood frequently finds its way into the stomach; the iris is much less acted on by light, but not contracted. When the relaxation of the muscles has fully taken place, then the reduction of dislocations and hernia may be effected. If the inhalation is continued beyond this stage, symptoms indicative of danger succeed; the breathing becomes very stertorous, slow, and may altogether cease, and death takes place, sometimes accompanied with convulsions. Chloroform has been administered in the form of vapour in the treatment of tetanus, hydrophobia, colic, and painful spasmodic affections, as during the passage of a renal calculus, or of gall stones, &c.; in some of these cases its use has been followed by great relief. The first and second set of symptoms above mentioned may be generally produced by administering from half a fluid drachm to a fluid drachm, and repeating it in a few minutes if this condition is required to be kept up. When the inhalation is suspended, the patient, in the course of five or six minutes, usually recovers his consciousness, but without remembering any thing which has taken place. For the production of complete insensibility and relaxation more chloroform must be employed, and the effects carefully watched. If it has proceeded too far, ammonia, dashing cold water in the face, or even artificial respiration, must be had recourse to. In the administration of chloroform, several precautions should be taken. In the first place, the chloroform should be pure, that is, free from oily matter, hydrochloric acid, and uncombined chlorine: it should not be used at all, or, if so, with the greatest care, in patients suffering from any cerebral disease, or any tendency to such, or any organic cardiac affection. It may be administered in vapour either by means of a folded handkerchief applied over the face and nose, or by means of inhalers which are sold for this purpose; and care should be taken that the patient breathes atmospheric air at the same time as the chloroform vapour. Disagreeable symptoms sometimes occur after the inhalation of chloroform, as nausea, vomiting, head-ache: probably these may occasionally arise from impurities in the preparation. *Ether*, and the vapour of some other hydrocarbons, as benzoin, Dutch liquid, bisulphuret of carbon, &c., when inhaled, produce effects not unlike those of chloroform; and before the discovery of this latter agent pure ether was always made use of. Its effects appear to be almost identical with those of chloroform, but the quantity requires to be much greater, from f. ℥j. to f. ℥ij.

It is stated by Dr. Snow that greater muscular relaxation is

produced by ether than by chloroform. When chloroform is taken into the stomach, or exhibited in the form of vapour, it is absorbed into the blood, and can be detected in that fluid. Dr. Snow has thus discovered its presence in the blood of animals killed by this agent. Its detection can be effected by causing the vapour from the suspected fluid to pass through a red-hot tube, when the chloroform, if present, is decomposed and free chlorine evolved, which may be made to act upon nitrate of silver, or upon starch-paper impregnated with iodide of potassium.

Modes of administration. — Chloroform, when given in a liquid state, may be rubbed up with yolk of egg and mucilage, or syrup, or dissolved in spirit: the dose may be from ♏ x. to ♏ xl. Externally, it may be employed as an embrocation or ointment: one part of chloroform should be added to from 7 to 11 parts of any liniment, or it may be rubbed up with the same amount of lard. For inhalation the doses have been indicated above.

CONFECTIONES.

CONFECTIONS.

UNDER this title the London College comprehends the *Conserves* and *Electuaries* of the Edinburgh Pharmacopœia. There is, however, a distinction between the confections or conserves and electuaries, which prevents them in strict propriety from being classed together; and this we shall point out, although at the same time we adhere to the title of the London College.

CONFECTIONS or CONSERVES consist of fresh vegetable matters, beat into a uniform mass with refined sugar. They are designed to preserve, as nearly as possible, unaltered, the virtues or properties of recent vegetables, and to prevent the decomposition to which they would otherwise be liable; and, although several delicate flowers and fruits and juicy plants can be well preserved by this means, yet this form of preparation is not adapted for all plants; and, in many cases, the active ingredients are injured by the fruits being kept in this state. As remedial agents, confections possess little activity; and are chiefly useful as vehicles for the administration of more active substances. They should be kept in closely-covered jars, in order to preserve their proper degree of moisture.

ELECTUARIES[1] are mixtures of vegetables and light earthy

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[1] Εκλεκτον Hippocratis.

powders, combined by means of honey or of syrup so as to form masses of a moderate consistence. All substances of this description may therefore be made into electuaries; but, as the intention of this form of preparation is to render remedies as palatable as possible, those matters only can be employed to form electuaries, the taste of which is not too ungrateful to be covered by syrup or honey. They are more active remedies than conserves; but still the more powerful vegetable substances cannot well be exhibited in this form, on account of their taste; and the metallic salts are too ponderous to remain suspended in either syrup or honey. In making electuaries, the degree of consistence must always be regulated by the nature of the substances which enter into them; which must, also, be very minutely powdered.

"In *Conserves*," as Dr. Murray justly remarks, "the addition of the saccharine matter is in much larger proportion, and is designed to preserve the vegetable matter; in *Electuaries* the syrup is designed merely to communicate the required form."

"If confections have become hard from long keeping, they are to be moistened with water, so as to restore their proper consistence."

CONFECTIO AMYGDALÆ, Lond. CONSERVA AMYGDALARUM, Edin. *Confection of Almonds. Conserve of Almonds.*

"Take of sweet almonds, *eight ounces;* acacia gum, in powder, *an ounce;* sugar, *four ounces.* Bruise the almonds, first macerated in cold water, and deprived of their external coats; then rub them through a fine metallic sieve; and the other ingredients being added, beat all together until thoroughly incorporated. This confection will keep longer sound if the almonds, first decorticated, dried and rubbed into the finest powder, be mixed with the acacia and sugar, separately powdered, and the mixed ingredients be kept in a well-stopped bottle."

Edinburgh.

"Take of sweet almonds, *eight ounces;* powder of gum arabic, *one ounce;* white sugar, *four ounces.* Blanch the almonds by maceration and peeling, and beat them with the gum and sugar into a uniform pulpy mass."

This preparation, which is not strictly a confection, but a paste, affords an easy and expeditious mode of preparing the almond mixture. A little of this paste, or the powder, triturated with a sufficient portion of water, immediately forms an emulsion. It may be made with bitter almonds. The emulsion should be strained through calico.

CONFECTIO AROMATICA. Lond. Dub. *Aromatic Confection.*

"Take of cinnamon, nutmegs, of each, *two ounces;* cloves, *an ounce;* cardamoms, *half an ounce;* saffron, *two ounces;* prepared chalk, *sixteen ounces;* sugar, *two pounds:* distilled water, *as much as may be necessary.* Rub the dry substances mixed together into a very fine powder, and keep them in a close vessel; and when the confection is to be used, add two fluid drachms of water, and mix all the ingredients together until they be thoroughly incorporated."

Dublin.

"Take of aromatic powder, *five ounces;* dried saffron in fine powder, *half an ounce;* oil of cloves, *half a fluid drachm;* simple syrup, *five fluid ounces;* clarified honey, by weight, *two ounces.* Rub the aromatic powder with the saffron; add the syrup and honey, beat them well together till thoroughly mixed; lastly, add the oil of cloves."

ELECTUARIUM AROMATICUM, Edin. *Aromatic Electuary.*

"Take of aromatic powder, *one part;* syrup of orange-peel, *two parts.* Mix them, and triturate them into a uniform pulp."

In forming this combination the London College has ordered the ingredients to be kept in the form of powder. As a compound of aromatics it is stimulant and cordial. It is given with advantage in typhoid fevers, atonic gout, and nervous languors; either alone, in the form of bolus, or combined with camphor, and syrup of orange-peel, in the form of mixture. This dose is from grs. x. to ʒj. or more.

CONFECTIO AURANTII, Lond. *Confection of Orange.*

"Take of the rind of the fresh orange, separated by rasping, *a pound;* sugar, *three pounds.* Beat the rind in a stone mortar with a wooden pestle; then add the sugar, and continue the beating until the whole be thoroughly incorporated."

CONSERVA AURANTII, Edin. *Conserve of Orange.*

"Grate off the outer rind of bitter oranges, and beat it into a pulp, adding gradually thrice its weight of white sugar."

This confection is gently stomachic, and is a pleasant vehicle for the exhibition of tonic powders.

CONFECTIO CASSIÆ, Lond. *Confection of Cassia.*

"Take of prepared cassia, *half a pound;* manna, *two ounces;* prepared tamarind, *an ounce;* syrup of roses, *eight fluid ounces.* Bruise the manna; then dissolve it in the syrup; afterwards mix in the cassia and tamarind; evaporate down to a proper consistence."

This electuary is gently laxative, and is used to relieve habitual costiveness; as a purge for children; and as a vehicle for the exhibition of other more powerful purgatives. Dose ʒij. to ℥j. for adults.

ELECTUARIUM CATECHU, Edin. *Electuary of Catechu.*

"Take of catechu and kino, of each, *four ounces;* cinnamon and nutmeg, of each, *one ounce;* opium, diffused in a little sherry, *one drachm and a half;* syrup of red roses, reduced to the consistence of honey, *a pint and a half.* Pulverize the solids; mix the opium and syrup, then the powders, and beat them thoroughly to a uniform mass."

CONFECTIO CATECHU COMPOSITUM, Dub. *Compound Confection of Catechu.*

"Take of compound powder of catechu, *five ounces;* simple syrup, *five fluid ounces.* Add the syrup gradually to the powder, and mix them well together."

These are useful combinations of astringents and aromatics; and may be efficaciously given in diarrhœas, and the last stage of dysentery, either in the form of bolus, or diffused in some distilled water. The dose is from ℈j. to ʒij. Ten scruples of the Edinburgh electuary should contain one grain of opium. The Dublin has no narcotic in its composition.

CONFECTIO OPII, Lond. *Confection of Opium.*

"Take of opium, powdered, *six drachms;* long pepper, *an ounce;* ginger, bruised, *two ounces;* carraway, *three ounces;* tragacanth, powdered, *two drachms;* syrup, *sixteen fluid ounces.* Rub the dry ingredients together to a fine powder, and keep it in a close vessel. Whenever the confection is to be used, add syrup, made hot, and mix.

ELECTUARIUM OPII. Edin. *Electuary of Opium.*

"Take of aromatic powder, *six ounces;* Senega, in fine powder, *three ounces;* opium, diffused in a little sherry, *half an ounce;*

syrup of ginger, *a pound.* Mix them together, and beat them into an electuary.

Syn. Electuaire Opiate (*F.*), Theriaklalwerge (*G.*), Elettuario Oppiato (*I.*).

The operation of the opium, in these preparations, is modified by the aromatics. They are intended as substitutes for the *mithridate* and *theriaca* of the old pharmacopœias, which were too long allowed to disgrace modern practice. They are stimulant narcotics; and are usually employed in atonic gout, flatulent colic, and in diarrhœas, unattended by any inflammatory symptoms. Thirty-five grains of the London confection contain one grain of opium, and the same quantity is contained in forty-three of the Edinburgh electuary. The dose is from grs. xv. to f ʒ j.

CONFECTIO PIPERIS, Lond. *Confection of Pepper.*

"Take of black pepper, elecampane-root, of each, *one pound;* fennel seeds, *three pounds;* honey, sugar, of each, *two pounds.* Rub together the dry ingredients to a fine powder, and keep in a covered vessel. Whenever the composition is to be used, add the powder gradually to the honey, and beat the whole into a mass."

CONFECTIO PIPERIS NIGRI, Dub. *Confection of Black Pepper.*

"Take of black pepper, in fine powder, liquorice root, in powder, of each, *half an ounce;* refined sugar, *one ounce;* oil of fennel, *half a fluid drachm;* clarified honey, by weight, *two ounces.* Rub the dry substances together into a very fine powder, then add the honey and oil, and beat them into a uniform mass."

ELECTUARIUM PIPERIS, Edin. *Electuary of Pepper.*

"Take of black pepper, and liquorice-root, in powder, of each, *a pound;* fennel, *three pounds;* honey and white sugar, of each, *two pounds.* Triturate the solids together into a very fine powder; add the honey, and beat the whole into a uniform mass."

These preparations are warm stimulants, and are intended as a substitute for Ward's Paste in hæmorrhoids. The dose is from ʒ j. to ʒ ij.

CONFECTIO ROSÆ CANINÆ, Lond. *Confection of the Dog-Rose.*

"Take of fruit of the dog-rose, without the seeds, *a pound;* sugar, in powder, *twenty ounces.* Pound the pulp of the rose with the sugar, gradually added, until they be well incorporated."

CONSERVA ROSÆ FRUCTUS, Edin. *Conserve of the Dog-Rose.*

"Take any convenient quantity of hips, carefully deprived of carpels; beat them to a fine pulp, adding gradually thrice their weight of white sugar."

This confection is chiefly used for forming pill masses, where the tannic acid of the red rose would be hurtful.

CONFECTIO ROSÆ, Lond. Dub. *Confection of the Rose.*

"Take of the petals of the red rose, *a pound;* sugar, *three pounds.* Beat the petals in a stone mortar; then add the sugar, and pound them again, until the whole be thoroughly incorporated."

Dublin.

"Take of dried petals of the gallic rose, *one ounce;* rose-water, *two fluid ounces;* refined sugar, *eight ounces.* Macerate the petals in the rose-water for two hours; add the sugar gradually, and beat them into a uniform mass."

Or,

"Take of fresh petals of the gallic rose, *three ounces;* refined sugar, *eight ounces.* Rub the petals in a mortar, then add the sugar gradually, and beat them together till they are intimately mixed."

CONSERVA ROSÆ, Edin. *Conserve of Roses.*

"Beat the petals of Rosa Gallicia to a pulp, gradually adding twice their weight of sugar."

Syn. Conserve de Roses rouges (*F.*), Rosenconserve (*G.*), Conserva di Rose rosse (*I.*).

This confection possesses a slight degree of astringency; and, when it is rubbed up in new milk, it may be employed as a tonic in early convalescence from acute diseases: but its chief use is to form a pleasant vehicle for more active remedies. It is, in solution, an excellent medium for exhibiting the disulphates of quina and of cinchonia; but the solutions should be acidulated with diluted nitric acid: when diluted sulphuric acid is used the solution becomes turbid. It is also, in solution, a good vehicle for sulphate of magnesia, and the mineral acids.

The dose is ʒ j. to ʒ ij.

CONFECTIO RUTÆ, Lond. *Confection of Rue.*

"Take of fresh rue, bruised, carraway, bayberries, of each, *an*

ounce and a half; prepared sagapenum, *half an ounce*; black pepper, *two drachms*; honey, *sixteen ounces*; distilled water, *as much as may be necessary*. Rub the dry ingredients together to a very fine powder; then the sagapenum being dissolved in the water and honey, over a slow fire, to them gradually add the powder, and mix all together."

This electuary possesses antispasmodic virtues. It is used in the form of enema only: from ℈ j. to ʒ j., dissolved in O ss. of gruel, being administered in the convulsive affections of infants, and in flatulent colic.

CONFECTIO SCAMMONII[1], Lond. Dub. *Confection of Scammony.*

"Take of scammony, *an ounce and a half*; bruised cloves, ginger, powdered, of each, *six drachms*; oil of carraway, *half a fluid drachm*; syrup of roses, *a sufficient quantity*. Rub the dry substances into a very fine powder, and preserve them in a closed vessel: then, whenever the confection is to be used, add gradually the syrup, and rub again; lastly, after adding the oil of carraway, mix the whole together."

Dublin.

"Take of scammony, in fine powder, *three ounces*; ginger, in fine powder, *one ounce and a half*; oil of carraway, *one fluid drachm*; oil of cloves, *half a fluid drachm*; simple syrup, *three fluid ounces*; clarified honey, by weight, *one ounce and a half*. Beat the powders with the syrup and honey into a uniform mass, then add the oils, and mix all well together."

This is a stimulating cathartic: a drachm contains about twenty grains of scammony. It may be given in a dose of from grs. x. to ʒ ss., but it is seldom ordered.

CONFECTIO SENNÆ[2], Lond. Dub. *Confection of Senna.*

"Take of senna, *eight ounces*; figs, *a pound*; prepared tamarinds, prepared cassia, prepared prunes, of each, *half a pound*; coriander, fresh, *four ounces*; liquorice, bruised, *three ounces*; sugar, *two pounds and a half*; distilled water, *three pints*. Rub the senna with the coriander, and separate by sifting ten ounces of the mixed powder. Boil the water with the figs and liquorice added, until it be reduced one half; then press out and strain the liquor.

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[1] Electuarium caryocostinum, P. L. 1720. Electuarium e scammonio, P. L. 1745. Electuarium scammonii, P. L. 1787.

[2] Electuarium lenitivum, P. L. 1720. Electuarium sennæ, P. L. 1787.

Evaporate the strained liquor in a water-bath, until twenty-four fluid ounces remain; then, the sugar being added, make a syrup. To this mix the tamarinds, cassia, and prunes; and a little before they have cooled, the sifted powder being added by degrees, stir diligently with a spatula until the whole be thoroughly incorporated."

Dublin.

"Take of senna, in fine powder, *two ounces;* coriander, in fine powder, *one ounce;* oil of carraway, *half a fluid drachm;* pulp of prunes, *five ounces;* pulp of tamarinds, *two ounces;* brown sugar, *eight ounces;* water, *two ounces.* Dissolve the sugar in the water, and beat the pulps with the syrup to a uniform consistence: having stirred in the powders and oil of carraway, mix all well together, and heat the mass thoroughly in a water-bath for ten minutes."

ELECTUARIUM SENNÆ, Edin. *Electuary of Senna.*

"Take of senna, *eight ounces;* coriander, *four ounces;* liquorice-root, bruised, *three ounces;* figs, *a pound;* pulp of prunes, *a pound;* refined sugar, *two pounds and a half;* water, *three pints and a quarter.* Powder the senna and coriander; sift out ten ounces of the mixture; boil the residue with the figs and liquorice in the water down to one half; express and strain the liquor, and evaporate it to twenty-four fluid ounces: dissolve in this the sugar, and add the liquid by degrees to the pulp of prunes; mix gradually the powder, and triturate the whole carefully to a uniform pulp."

These electuaries, when properly prepared, are mild and pleasant purgatives, and well adapted for those who are afflicted with habitual costiveness; and for pregnant women. They are similar to the old *lenitive electuary.* The dose is from ℨ ij. to ℨ iv. or more, taken at bed-time.

DECOCTA.

DECOCTIONS.

THESE are aqueous solutions of the active principles of vegetables obtained by boiling. They are intended to afford more powerful remedies than can be obtained by the simple infusion of the same substances in cold or even in boiling water; but, although, by the operation of boiling, the solvent power of the water is increased, and a greater quantity of the soluble parts of any vegetable body is consequently taken up by it, yet it does not always follow that

the medicinal virtues of decoctions are greater than those of infusions. On the contrary, if the active principles of a plant be volatile, or if they consist chiefly of extractive matter, this form of preparation often renders the remedy altogether inert, either by dissipating the volatile matters, or by favouring the oxidizement of the extractive, which, in a continued temperature of 212°, attracts the oxygen of the atmosphere so rapidly, that it is soon converted into a soluble, insipid, inert matter, and precipitated in the fluid. This is the case with some substances, which are nevertheless ordered to be prepared in this form by the Colleges, and which we shall particularly notice in treating of the individual decoctions.

For making decoctions, the substances employed must be divided, if in the dry state, by pulverization, or, if fresh, by slicing, so as to expose an extended surface to the action of the water, which is thus enabled to take up their soluble principles in a shorter space of time; a circumstance, for the reasons already stated, of much importance in the preparation of decoctions. By covering the vessel in which they are made, the action of the air is prevented from affecting the ingredients; but there is reason for believing, that by long coction in water, even in covered vessels, the constituents of some vegetable bodies re-act upon one another, and produce entirely new compounds, possessed of properties altogether different from those which they previously contained. On this account, decoctions should be quickly made; and when aromatic or volatile ingredients are to enter into them, these should not be boiled with the more fixed substances, but the decoction, after it is made, should be poured over them, and allowed to remain covered up until it be nearly cold before it is strained. In general, however, it is better to strain decoctions while they are hot through a sieve; for, as boiling water dissolves a larger proportion of vegetable matter than it can retain in solution at a lower temperature, a deposit almost always takes place as the decoction cools; and if this be of active matter, it is lost by deferring the straining; whereas, by straining the decoction while hot, the deposit can be mingled, by being shaken with the clear fluid, when it enters into extemporaneous compositions, or when the dose of it is taken.

Decoctions, from the nature of their constituents, very soon ferment and spoil; consequently they should be prepared in small quantities only, and not kept, particularly in summer, more than forty-eight hours after they have been made.

DECOCTUM ALOES COMPOSITUM, Lond. Dub. *Compound Decoction of Aloes.*

"Take of extract of liquorice, *seven drachms;* carbonate of potassa, *a drachm;* extract of socotrine aloes, myrrh, powdered, saf-

fron, of each, *a drachm and a half;* compound tincture of cardamoms, *seven fluid ounces;* distilled water, *a pint and a half.* Boil down the liquorice, carbonate of potassa, aloes, myrrh, and saffron, with the water, to a pint, and strain; then add the tincture."

Dublin.

"Take of hepatic aloes, in powder, *one drachm and a half;* myrrh, in powder, saffron, chopped fine, of each, *one drachm;* pure carbonate of potash, *two scruples;* extract of liquorice, *half an ounce;* water, *fourteen ounces;* compound tincture of cardamoms, *as much as is sufficient.* Rub the aloes, myrrh, carbonate of potash, together, then add the saffron and extract of liquorice, and boil for ten minutes in a covered vessel; cool, strain through flannel, and add of compound of cardamoms as much as will make sixteen fluid ounces."

DECOCTUM ALOES, Edin.

"Take of Socotrine or hepatic aloes, powder of myrrh, and saffron, of each, *one drachm;* extract of liquorice, *half an ounce;* carbonate of potash, *two scruples;* compound tincture of cardamom, *four fluid ounces;* water, *sixteen fluid ounces.* Mix the aloes, myrrh, saffron, liquorice, and carbonate of potash with the water; boil down to twelve ounces; filter, and add the compound tincture of cardamom."

By the addition of the alkali in this preparation, the water is enabled to hold in solution a greater portion of the aloes than it could otherwise retain, while another portion is suspended by the mucilage of the liquorice and the myrrh. Protracted boiling is injurious, inasmuch as it aids the conversion of the aloes into an insoluble resinoid. The tincture prevents any spontaneous decomposition from taking place. The taste of the decoction is extremely nauseous, notwithstanding the bitter of the aloes is in some degree covered by the liquorice: but patients, even children, are soon reconciled to it; and in some instances it is preferred to all other purgatives simply on account of its flavour. It is decomposed, and precipitated by all the strong acids; bichloride of mercury, tartarized antimony, sulphate of zinc, and acetate and diacetate of lead; hence these substances are incompatible in formulæ with this decoction. It may be kept for a much longer time than any other decoction without spoiling.

Medical properties and uses.—It is a warm cathartic, analogous in its action to the well-known *beaume de vie;* which, however, contains no alkali. It may be given with advantage in habitual costiveness, and to counteract the torpid state of bowels in dys-

pepsia, hypochondriasis, jaundice, and chlorosis, in the dose of from f ℥ ss. to f ℥ ij., taken in the morning.

The Dublin decoction contains the most aloes.

DECOCTUM AMYLI[1], Lond. *Decoction of Starch.*

"Take of starch, *four drachms;* water, *a pint.* Rub the starch with the water gradually added, then boil for a short time."

The colourless or white starch only should be used for this decoction. It is administered as an enema in dysentery and excoriations of the rectum.

DECOCTUM CETRARIÆ[2], Lond. *Decoction of Liverwort.*

"Take of liverwort, *five drachms;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

DECOCTUM LICHENIS ISLANDICI, Dub. *Decoction of Iceland Moss.*

"Take of Iceland moss, *one ounce;* water, *a pint and a half.* Wash the the moss in cold water, to remove impurities, then boil for ten minutes, in a covered vessel, and strain while hot. The product should measure about one pint."

In these decoctions the bitter principle of the lichen is united with *lichenin*, a modification of fecula. It is so nauseous that few patients will be persuaded to take it in this form. The dose is from f ℥ j. to f ℥ iv. three times a day. The addition of f ʒ ij. of distilled vinegar, or ♏ xv. of diluted sulphuric acid, with a little syrup, and ♏ x. of tincture of opium, renders it very useful in phthisis.

DECOCTUM CHIMAPHILÆ, Lond. *Decoction of Winter-green or Pyrola.*

"Take of chimaphila, *one ounce;* distilled water, *a pint and a half.* Boil to a pint, and strain."

DECOCTUM PYROLÆ, Dub. *Decoction of Pyrola or Winter-green.*

"Take of leaves of winter-green, dried, *half an ounce;* water, *half a pint.* Boil for ten minutes, in a covered vessel, and strain. The product should measure about eight ounces."

This decoction is a useful form of administering chimaphila in

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[1] Mucilago *Amyli*, 1788—1824.
[2] Decoctum Lichenis, P. L. 1809—1824.

ascites and other dropsies connected with a broken-down constitution: its influence is aided by the addition of bitartrate of potassa. The dose is from f ℥ j. to f ℥ ij.

DECOCTUM CINCHONÆ[1], Lond. Edin. Dub. *Decoction of Cinchona.*

"Take of yellow cinchona, bruised, *ten drachms;* distilled water, *a pint.* Boil for ten minutes in a lightly-covered vessel, and strain the liquor while it is hot."

Edinburgh.

"Take of crown, grey, yellow, or red cinchona, bruised, *one ounce;* water, *twenty-four fluid ounces.* Boil for ten minutes, let the decoction cool, then filter it, and evaporate to sixteen fluid ounces."

Dublin.

"Take of Peruvian bark, crown or pale, in coarse powder, *half an ounce;* water, *half a pint.* Boil for ten minutes, in a covered vessel, and strain while hot. The product should measure about eight ounces."

DECOCTUM CINCHONÆ PALLIDÆ, Lond. *Decoction of Pale Bark.*

DECOCTUM CINCHONÆ RUBRÆ, Lond. *Decoction of Red Bark.*

"These decoctions are to be prepared in the same manner as that of yellow cinchona."

Syn. Décoction de Quinquina (*F.*), Chinadekokte (*G.*), Decotto di China (*I.*).

Cinchona bark is one of those substances which suffers by long boiling with water; and therefore the Colleges have properly limited the time of boiling to ten minutes, and ordered the vessel to be covered, and the liquor to be strained while it is hot. As the strained decoctions cool, they become turbid, and let fall a reddish or yellowish powder, according to the kind of bark employed; this, however, must not be rejected, but diffused through the clear decoction when it is about to be used in compounding extemporaneous mixtures, or when the dose is to be taken. When the de-

[1] Decoctum Cinchonæ Cordifoliæ, P. L. 1836.

coction is made with the pale or crown cinchona, it contains kinate of cinchonia with a small proportion of kinate of quina; and on these salts its peculiar properties depend. When the yellow bark is used, the active principle is chiefly kinate of quina. Both decoctions contain tanic acid and kinate of lime, red cinchonic, fecula, and gum. The decoction of the red bark contains kinates of quina and of cinchonia, with more tannic acid than exists in the other two decoctions. By long boiling, says Pelletier, the tannic acid and starch form a compound insoluble in cold water, and which is, therefore, in conjunction with colouring matter, kinate of lime, &c. precipitated as the decoction cools, and carries down also a portion of the cinchonia and quina; to remedy which Pelletier recommends a larger quantity of water to be used, and the decoction to be filtered and evaporated. This, however, is a tedious process; and as sulphates of cinchonia and quina are very soluble, we are of opinion that the addition of f ʒ j. of diluted sulphuric acid to the water for making the decoction will better answer this intention.

These decoctions are more bitter, but less aromatic, than the infusions. They are affected by the same re-agents, and used in the same cases, and in similar doses. The dose is from f ℥ j. to f ℥ ij.

DECOCTUM CYDONII, Lond. *Decoction of Quince Seeds.*

"Take of quince seeds, *two drachms;* water, *a pint.* Boil them over a gentle fire for ten minutes, then strain."

Quince seeds abound with mucilage, which is extracted by boiling water. It is considerably viscid, transparent, nearly colourless, insipid, and inodorous. It is coagulated by alcohol, acids, and most of the metallic salts, which, therefore, are incompatible, in formulæ with it; and it must be used as soon as it is made, for it soon spoils, owing, perhaps, to its containing some of the other constituents of the seeds.

Medical properties and uses. — This is often perferred to the other mucilages as a local demulcent in tenesmus, and in aphthous affections and excoriations of the mouth. A diluted solution of it injected beneath the eye-lids is useful for obtunding the acrimony of the discharge in violent inflammations of the eye.

DECOCTUM DULCAMARÆ, Lond. Edin. Dub. *Decoction of Woody Nightshade.*

"Take of woody nightshade, *ten drachms;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

Edinburgh.

"Take of dulcamara, chopped down, *one ounce;* water, *twenty-four fluid ounces.* Mix them, boil, and concentrate by evaporation to sixteen fluid ounces."

Dublin.

"Take of twigs of woody nightshade, dried, *half an ounce;* water, *half a pint.* Boil for ten minutes, in a covered vessel, and strain. The product should measure about eight ounces."

This decoction contains a trace of solania in combination with some acid. It has a strong, unpleasant odour, and a bitter, nauseous taste, followed by a degree of sweetness.

Medical properties and uses.—It is possessed of diuretic, diaphoretic, and narcotic properties; and has been found useful in humoral asthma and dropsy, and in lepra *vulgaris* and *alphos,* psoriasis, and pityriasis, in conjunction with bichloride of mercury.

The dose is from f ʒ iv. to f ℥ j. combined with any aromatic tincture, given three times a day.

DECOCTUM GALLÆ, Lond. *Decoction of Gall.*

"Take of bruised galls, *two ounces and a half;* distilled water, *two pints.* Boil down to a pint and strain."

A powerful astringent. Dose f ℥ ss. to ℥ j.

DECOCTUM GRANATI, Lond. *Decoction of Pomegranate.*

"Take of pomegranate (rind) *two ounces;* distilled water, *a pint and a half.* Boil down to a pint and strain."

DECOCTUM GRANATI RADICIS, Lond. *Decoction of the root of Pomegranate.*

"Take of Pomegranate root, sliced, *two ounces;* distilled water, *two pints.* Boil down to a pint and strain."

These are useful and powerful astringent decoctions. That of the root is a successful specific for tænia. Dose ℥j. to ℥ij.

DECOCTUM GUAIACI, Edin. *Decoction of Guaiacum.*

"Take of guaiac turnings, *three ounces;* sassafras, rasped, *one ounce;* liquorice root, bruised, *one ounce;* raisins, *two ounces;* water, *eight pints.* Boil the guaiac and raisins with the water gently down to five pints, adding the liquorice and sassafras towards the end. Strain the decoction."

Syn. Décoction de Guajac (*F.*), Guajack-dekokte (*G.*), Decotto di Guajaco (*I.*).

This decoction derives less of its efficacy from the guaiacum than is generally imagined, a small portion of the active matter only being taken up by the water. It is, however, supposed to be useful in chronic rheumatism, some cutaneous diseases, and in syphilis during a mercurial course; but, probably, at best it is only serviceable as a demulcent. It may be taken in doses of a quarter of a pint, to the amount of Oj. or Oij. in the day.

DECOCTUM HÆMATOXYLI, Lond. Edin. Dub. *Decoction of Logwood.*

"Take of sliced logwood, *ten dachms;* distilled water, *a pint and a half.* Boil down to a pint and strain."

Edinburgh.

"Take of logwood, in chips, *one ounce;* cinnamon, in powder, *a drachm;* water, *one pint.* Boil the wood in the water down to *ten fluid ounces,* adding the cinnamon towards the end, and then strain."

Dublin.

"Take of logwood, in small chips, *one ounce*; water, *half a pint.* Boil for ten minutes, in a covered vessel, and strain. The product should measure about eight ounces."

This decoction is well suited to convey the tonic influence of the logwood. I have found it very serviceable in the diarrhœas of children connected with teething. The dose is f ʒ iv. to a child of a year old; for an adult, f ℥ j. to f ℥ ij.

DECOCTUM HORDEI, Lond. Dub. *Decoction of Barley.*

"Take of pearl barley, *two ounces and a half;* distilled water, *four pints and a half.* First wash away with cold water any extraneous substances that may adhere to the barley; then, having poured on it half a pint of water, boil for a little while. This water being thrown away, let the remainder be added boiling; then boil down to two pints, and strain."

Dublin.

"Take of pearl barley, *one ounce and half;* water, *one pint and half.* Wash the barley in cold water, reject the washings, then boil for twenty minutes, in a covered vessel, and strain."

DECOCTUM HORDEI COMPOSITUM, Lond. *Compound Decoction of Barley.*

"Take of decoction of barley, *two pints;* figs, sliced, *two ounces*

and a half; fresh liquorice (root), sliced and bruised, *five drachms;* raisins (stoned), *two ounces and a half;* water, *a pint.* Boil down to two pints, and strain."

MISTURA HORDEI, Edin. *Mixture of Barley.*

"Take of pearl barley, figs (sliced), raisins, freed of the seeds, of each, *two ounces and a half;* liquorice root, sliced and bruised, *five drachms;* water, *five pints and a half.* Clean the barley, if necessary, by washing it with cold water; boil it with four pints and a half of the water down to two pints; add the figs, raisins, and liquorice root, with the remaining pint of water; and again boil down to two pints; then strain."

Syn. Décoction d'Orge (*F.*), Gerstedekokte (*G.*), Decotto d'Orzo (*I.*).

The preparation of these decoctions is generally intrusted to nurses and the attendants of the sick-room: but a practitioner ought not to be ignorant of the best manner of making them, as his directions may be occasionally necessary. They are elegant and useful demulcents, in cases of fever, phthisis, gonorrhœa, strangury, and all acute diseases, given *ad libitum.* A few drops of tincture of opium may be added to the compound decoction, to obviate its laxative effect, where this might prove hurtful. Equal parts of this decoction, and of decoction of bark, form a useful gargle in cynanche maligna. The simple decoction, mixed with an equal quantity of good milk and a small portion of sugar, is an excellent substitute for the breast milk in those cases in which infants are so unfortunate as to require being brought up with the spoon.

DECOCTUM LINI COMPOSITUM, Dub. *Compound Decoction of Linseed.*

"Take of linseed, *one ounce;* liquorice root, bruised, *half an ounce;* water, *one pint and a half.* Boil for ten minutes in a covered vessel, and strain while hot."

Used as Infusum Lini Compositum, which it much resembles.

DECOCTUM MEZEREI, Edin. *Decoction of Mezereon.*

"Take of mezereon, in chips, *two drachms;* liquorice root, bruised, *half an ounce;* water, *two pints.* Mix them, and boil down with a gentle heat to a pint and a half, and then strain."

Syn. Décoction de Daphne Mezereon (*F.*), Scioblbastrinde-dekokte (*G.*), Decotto di Daphne Mezereon (*I.*).

This decoction is slightly mucilaginous, and of a yellowish-brown

colour; has the sweet taste of the liquorice root, with a slight degree of bitterness; and leaves in the mouth a sensation of heat and pungency, which, however, is scarcely felt until a few minutes after the dose has been swallowed.

Medical properties and uses.—This decoction was first made public by Dr. Alexander Russel[1] as an appropriate remedy for venereal nodes, arising from a thickening of the periosteum; and for removing those nocturnal pains with which venereal patients are afflicted. This opinion, however, has not been supported by experience; and Mr. Pearson[2] asserts, that it "has not the power of curing the venereal disease in any one stage, or any one form;" and adds, "except in an instance or two of lepra, in which the decoction conferred a temporary benefit, I have very seldom found it possessed of medicinal virtue, either in syphilis, or in the sequelæ of that disease, in scrofula, or in cutaneous affections." It has been given with seeming benefit in chronic rheumatism. The dose is from f ℥ iv. to f ℥ vj. three or four times a day.

DECOCTUM MYRRHÆ, Dub. *Decoction of Myrrh.*

"Take of myrrh, *two drachms;* water, *eight ounces and a half.* Triturate the myrrh with the water, gradually added; then boil for ten minutes, in a covered vessel, and strain. The product should measure about eight ounces."

Dose f ℥ ss. to f ℥ j., where the use of myrrh is indicated.

DECOCTUM PAPAVERIS, Lond. Edin. Dub. *Decoction of Poppy.*[3]

"Take of bruised poppy, *four ounces;* water, *four pints.* Boil for a quarter of an hour, and strain."

Edinburgh.

"Take of poppy-heads, sliced, *four ounces;* water, *three pints.* Boil for fifteen minutes, and then strain."

Dublin.

"Take of the capsules of the white poppy, sliced or bruised, *four ounces;* water, *three pints.* Boil for ten minutes, in a covered vessel, and strain."

In making this decoction, the seeds should not be rejected,

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[1] *Medical Observations and Enquiries,* vol. iii.
[2] *Pearson on the Remedies for Lues Venerea,* p. 47.
[3] Decoctum pro fomento, P. L. 1787.

as they contain a considerable portion of bland oil, which, added to the mucilage and narcotic principle of the capsule, increases the emollient quality of the decoction. It is a useful fomentation in painful swellings, in excoriations produced by the thin acrid discharge of ulcers, and in excoriations common to infants.

DECOCTUM PAREIRA, Lond. *Decoction of Pareira Brava.*

"Take of sliced pareira, *ten drachms;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

This preparation is superior to the Infusion, and may be given with advantage in the same cases.

DECOCTUM QUERCUS, Lond. Edin. Dub. *Decoction of Oak Bark.*

"Take of oak bark, bruised, *ten drachms;* distilled water, *two pints.* Boil down to a pint, and strain."

The Edinburgh process is identical with the London.

Dublin.

"Take of oak bark, bruised, *one ounce and a half;* water, *a pint and a half.* Boil for ten minutes, in a covered vessel, and strain."

This decoction contains the greater part of the astringent matter of the bark. It is nearly inodorous, has a brown colour and an austere taste; reddens tincture of litmus, and is precipitated by solutions of isinglass, infusion of yellow cinchona bark, the carbonates of the alkalies, the aromatic spirit of ammonia, lime-water, and solutions of sulphate of iron, acetates of lead, bichloride of mercury, and sulphate of zinc, which are, therefore, incompatible in formulæ with it. The precipitates produced by the two last salts do not take place for a considerable time. It does not precipitate tartar emetic in solution.

Medical properties and uses. — This is the usual form under which oak bark is exhibited. As a local astringent, it is used as a gargle in cynanche and in relaxation of the uvula; as an injection, in passive uterine hæmorrhages, epistaxis of aged persons, in leucorrhœa, and the gleety discharge which often remains after miscarriages. It is also a useful wash in piles and procidentia recti.

DECOCTUM SARZÆ, Lond. Edin. DECOCTUM SARSAPARILLÆ, Dub. *Decoction of Sarsaparilla.*

"Take of sarsaparilla, *five ounces;* distilled water, *four pints.* Boil down to two pints, and strain."

Edinburgh.

"Take of sarza, in chips, *five ounces;* boiling water, *four pints.* Digest the root in the water for two hours, at a temperature somewhat below ebullition; take out the root, bruise it, replace it, boil down to two pints; then squeeze out the decoction, and strain it."

Dublin.

"Take of sarsaparilla root, sliced, *two ounces;* boiling water, *a pint and a half.* Digest the sarsaparilla with the water for one hour, then boil for ten minutes, in a covered vessel, cool, and strain. The product should measure a little more than a pint."

Syn. Décoction de Sarsaparille (*F.*), Sarsaparille-dekokte (*G.*), Decotto di Sarsaparilla (*I.*).

We have already stated the claims which sarsaparilla has to the attention of the practitioner as a remedy in syphilis. The whole of the active matter of the root resides in the cortical part, and can be extracted from this by moderate boiling, and there is no necessity for various macerations and boilings, which, in fact, injure the remedy. The entire root, merely bruised, and macerated in water at 180° Fahr., yields up all its medicinal properties.[1] This decoction may be regarded as useful during the exhibition of mercury; and it is found to be so in dysuria, and incontinence of urine arising from a morbid irritability of the bladder. It affords precipitates with lime-water, solution of chloride of barium, and of acetate of lead, which are incompatible in formulæ with it.

DECOCTUM SARZÆ COMPOSITUM, Lond. Edin. Dub. *Compound Decoction of Sarsaparilla.*

"Take of decoction of sarsaparilla, boiling, *four pints;* sassafras chips, guaiacum rasped, liquorice root, bruised, of each, *ten drachms;* mezereon, *three drachms* (*half an ounce,* Edin.). Boil for a quarter of an hour, and strain."

Dublin.

"Take of sarsaparilla root, sliced, *two ounces;* sassafras root, in chips, guaiacum wood turnings, liquorice root, bruised, of each, *two drachms;* mezereon root, bark, *one drachm;* boiling water, *one*

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[1] The profession is indebted to Mr. Batley, of Fore Street, for his remarks on this subject. See *London Med. Repos.*, vol. xi. 130.; but more particularly to the late Mr. Pope, of Oxford Street. See *Trans. of the Medico-Chirurg. Soc. of London*, vol. xii. p. 344.

pint and a half. Digest all the ingredients with the water, in a covered vessel, for one hour; then boil for ten minutes, cool and strain. The product should measure a little more than a pint."

This decoction is an imitation of the once celebrated *Lisbon diet drink.* Some of its efficacy depends on the mezereon root bark. It operates as a diaphoretic and alterative, and is found to be useful in the treatment of secondary syphilis, chronic rheumatism, and in lepra, and some other cutaneous affections. The dose is from f ℥ iv. to f ℥ vj. taken three or four times a day.

DECOCTUM SCOPARII COMPOSITUM, Lond. *Compound Decoction of Broom.*

"Take of broom, juniper bruised, dandelion bruised, of each, *half an ounce;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

DECOCTUM SCOPARII, Edin. Dub. *Decoction of Broom.*

"Take of broom tops and juniper tops, of each, *half an ounce;* bitartrate of potash, *two drachms and a half;* water, *a pint and a half.* Boil them together down to a pint, and then strain."

Dublin.

"Take of broom tops, dried, *half an ounce;* water, *half a pint.* Boil for ten minutes, in a covered vessel, and strain. The product should measure about eight ounces."

This decoction possesses all the diuretic properties of the broom tops. The dose is from f ℥ ij. to f ℥ vj. three times a day.

DECOCTUM SENEGÆ, Lond. *Decoction of Senega.*

"Take of senega root, *ten drachms;* distilled water, *two pints.* Boil down to a pint, and strain."

Syn. Décoction of Polygale Senègæ (*F.*), Senagawurzel-dekokte (*G.*), Decotto di Polygala Senega (*I.*).

This decoction is of a brownish olive colour, inodorous, and has a hot, pungent taste. The dose is from f ℥jss. to f ℥ iij., taken three or four times a day.

DECOCTUM TARAXACI, Lond. Edin. *Decoction of Dandelion.*

"Take of bruised dandelion, *four ounces;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

Edinburgh.

"Take of taraxacum herb and root, fresh, *seven ounces;* water, *two pints.* Boil together down to one pint, and then strain."

By decoction, water takes up the whole of the active principles of the taraxacum. When the bowels are sluggish, or dropsical effusions are present, I have found the addition of the bitartrate of potassa greatly improve the efficacy of this decoction. Much depends on the time of digging up the roots. In the autumn they are full of milky juice, and are much more active than in spring. The dose is from f ℥ ij. to f ℥ iij. twice a day.

DECOCTUM TORMENTILLÆ, Lond. *Decoction of Tormentil.*

Take of tormentil, bruised, *two ounces;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

This is a convenient form for administering this powerful astringent. The dose is from f ℥ ss. to ℥ jss.

DECOCTUM ULMI, Lond. *Decoction of Elm Bark.*

"Take of fresh elm bark, bruised, *two ounces and a half;* distilled water, *two pints.* Boil to a pint, and strain."

This decoction is thick, slightly mucilaginous, and of a brown colour; has a faint odour, and a bitterish taste. Alcohol added to it produces a precipitate of light brown flakes; tinctures, therefore, in any considerable quantity, are inadmissible in formulæ with it. Its medicinal properties have been already noticed. The dose is from f ℥ iv. to f ℥ vj., taken twice or three times a day.

DECOCTUM UVÆ URSI, Lond. Dub. *Decoction of Whortleberry.*

"Take of whortleberry (leaves), *an ounce;* distilled water, *a pint and a half.* Boil down to a pint, and strain."

Dublin.

"Take of uva ursi, leaves, bruised, *half an ounce;* water, *half a pint.* Boil for ten minutes, in a covered vessel, and strain. The product should measure about eight ounces."

This decoction is a less valuable form than infusion for administering whortleberry. It has been employed in phthisis and in purulent affections of the urinary organs. It is incompatible with solutions of the salts of iron, nitrate of silver, and the acetates of lead. Decoctions of yellow bark, and solutions of opium, are also incompatible with it. The dose is from f ʒ iv. to f ℥ ij.

EMPLASTRA.

PLASTERS.

THESE are solid, tenacious compounds, adhesive at the ordinary heat of the human body. The base of the majority of plasters is a chemical combination of the semivitreous oxide of lead and oil; but some of them owe their consistence to wax and resin; and others contain no oily nor fatty matter whatsoever. Deyeux proposes[1] to confine the name of plasters to the combinations of metallic oxides with oils or fat; and to give those not containing oxides the term solid ointments; but this definition would include among the plasters some of the ointments, and exclude many of the plasters.

Plasters should not adhere to the hand when cold; they should be easily spread when heated; and should remain tenacious and pliant after they are spread; but should not be so soft as to run when heated by the skin. All plasters become too consistent and brittle when long kept; but in this case, those which are unctuous may be re-melted by a gentle heat, and some oil added to them. They are usually formed into rolls, which are wrapped in paper; and when they are to be used, they are melted and spread on leather, calico, linen, or silk. Those which contain metallic oxides ought to be melted by boiling water, for in a greater degree of heat the fatty matter is apt to reduce the oxide.

Plasters are employed as local remedies to answer various indications. When the materials of which they are formed are soft and bland, they are used simply as coverings to sores and abraded surfaces, to protect them from the action of the air, and give support to the parts; but in many instances they contain acrid and stimulating substances, and operate as rubefacients or as blisters.

EMPLASTRUM AMMONIACI, Lond. Edin. Dub. *Ammoniacum Plaster.*

"Take of prepared ammoniacum, *five ounces;* distilled acetic acid, *eight fluid ounces.* Dissolve the ammoniacum in the acid; then evaporate the solution over a slow fire, constantly stirring until it acquire a proper consistence."

Edinburgh.

"Take of ammoniac, *five ounces;* distilled vinegar, *nine fluid*

[1] *Annales de Chimie,* xxxiii. 52.

ounces. Dissolve the ammoniac in the vinegar, and then evaporate to a proper consistence over the vapour-bath, frequently stirring the liquid."

Dublin.

"Take of gum ammoniacum, in coarse powder, *four ounces;* proof spirit, *four fluid ounces.* Dissolve the ammoniacum in the spirit with the aid of heat, and strain, then evaporate the solution by means of a steam or water-bath, stirring constantly until it acquires a proper consistence."

This plaster is stimulant and resolvent. It is applied to scrofulous and indolent tumours and white swellings.

EMPLASTRUM AMMONIACI, CUM HYDRARGYRO, Lond. Edin. Dub. *Ammoniac Plaster, with Mercury.*

"Take of prepared ammoniacum, *a pound;* mercury, *three ounces;* olive oil, *a fluid drachm;* sulphur, *eight grains.* Add the sulphur gradually to the heated oil, stirring constantly with a spatula until they unite; then rub the mercury with them until the globules disappear; lastly, add, gradually, the ammoniacum melted, and mix the whole together."

Edinburgh.

The only difference in the directions of this College consists in the use of ammoniacum not previously prepared.

Dublin.

Take of ammoniac plaster, *four ounces;* mercurial plaster, *eight ounces.* Melt them together by means of a steam or water-bath, and stir constantly until the mixture stiffens on cooling."

In these plasters the mercury is probably in the state of minute mechanical division. They are discutients, and are applied to indurated glands, hydarthus, nodes, tophi, and indolent tumours.

EMPLASTRUM ASSAFŒTIDÆ, Edin. *Assafœtida Plaster.*

"Take of litharge plaster, and assafœtida, of each, *two ounces;* galbanum and bees' wax, of each, *one ounce.* Liquefy the gum resins together and strain them, then add the plaster and wax, also in the fluid state, and mix them all thoroughly."

This plaster is sometimes applied over the umbilical region, in flatulence and hysteria.

EMPLASTRUM BELLADONNÆ, Lond. Edin. Dub. *Plaster of Belladonna.*

"Take of extract of belladonna, soap plaster, of each, *three ounces;* add the extract to the plaster melted by the heat of a water-bath. Mix and keep constantly stirring, that it may become of a proper consistence."

Edinburgh.

"Take of plaster of resin, *three ounces;* extract of belladonna, *an ounce and a half.* Add the extract to the plaster, melted by a gentle heat, and agitate briskly."

Dublin.

"Take of extract of belladonna, *one ounce;* resin plaster, *two ounces.* Melt the plaster by the heat of a steam or water-bath, then add the extract and mix them intimately."

This is a useful local application in cases of chronic pains, and applied to the sacrum in dysmenorrhœa.

EMPLASTRUM CALEFACIENS, Dub. *Warm Plaster.*

"Take of plaster of cantharides, *half a pound;* Burgundy pitch, *five pounds and a half.* Melt them together by means of a steam or water-bath, and withdrawing the heat, stir constantly until the mixture stiffens."

This plaster is stimulant and rubefacient, and is applied with advantage in bronchitis, hooping-cough, sciatica, and local pains. The proportion of plaster of cantharides is rather too great, as it seldom fails to blister or produce a running sore, in many persons.

EMPLASTRUM CANTHARIDIS, Lond. Edin. Dub. *Blistering Plaster.*

"Take of cantharides, rubbed to a very fine powder, *a pound;* wax and suet, of each, *seven ounces and a half;* resin, *three ounces;* lard, *six ounces.* To the wax, suet, and lard, liquefied together, add the resin previously melted, then remove them from the fire, and a little before they concrete, sprinkle in the cantharides, and mix."

Edinburgh.

"Take of cantharides, in very fine powder, resin, bees' wax, and suet, of each, *two ounces.* Liquefy the fat, remove from the heat, sprinkle in the cantharides, and stir briskly, as the mixture concretes on cooling.

Dublin.

"Take of Spanish flies, in very fine powder, *six ounces;* yellow wax, resin, prepared lard, of each *four ounces.* To the wax, resin, and lard, previously melted together, by a steam or water heat, add the Spanish flies, and stir the mixture constantly until the plaster is cool."

Syn. Emplâtre de Cantharides (*F.*), Kanthariden pflaster (*G.*), Emplastro di Cantarelle (*I.*).

These plasters are of a moderately soft consistence, the Edinburgh least soft, so as to admit of being spread without the assistance of heat, which destroys the acrimony and epispastic property of the blistering beetle: they seldom fail of raising a blister if the cantharides be good, and have not been added when the other in-ingredients were too hot. When they are to be used, a piece of leather, of a proper shape and size, is first spread with adhesive plaster, and over this the blistering plaster is extended, of a moderate degree of thickness and as smooth as possible, by means of the thumb; a proper margin being left, so as to enable it to adhere closely to the skin; but a blistering plaster should not be bandaged down. There is, however, in this method of using cantharides, a waste of flies, as those only which are on the surface of the plaster, when it is spread, can act on the skin; and it has been suggested by Parmentier[1], that the same effect would be more economically produced by sprinkling the powdered flies on a piece of farinaceous paste, spread on linen or leather. Blistering plasters require to remain applied for eight or ten hours, to raise a blister; they are then to be removed; the vesicle is to be cut at the most depending part; and, without removing the cuticle, the vesicated part is to be dressed with simple cerate or spermaceti ointment, spread on the soft side of a piece of *lint;* and the old cuticle allowed to remain until a new one is formed under it, when it peels off, and the whole is healed in the course of a few days. The application of these plasters, however, is sometimes attended with strangury and bloody urine, which arise from the *cantharidin* being absorbed, and irritating the kidneys and urethra. This effect is much increased if the blister be applied over an abraded surface, as, for example, on the head immediately after it has been shaved; and it also occurs if the plaster remain too long applied. To prevent strangury, camphor has been recommended to be mixed with the blistering composition, but it has no good effect; and the action on the urinary organs is better obviated by copious dilution with milk, or mucilaginous fluids, and fomentations of warm milk and

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[1] *Annales de Chimie,* xlviii.

water to the blistered part, after the removal of the plaster; and if it be very severe, by an enema of warm water and twenty minims of tincture of opium. When the head is the part intended to be blistered, it should be shaved at least ten hours before the plaster is applied; and it is a good rule to interpose a thin piece of gauze, wetted with vinegar, between the vesicatory and the skin, applied smooth and very close over the plaster.

In persons of delicate habits, and those labouring under some diseases of irritation, particularly children, the blistered part, instead of healing kindly, becomes a spreading sore: the cutis vera is destroyed, and the part cannot be healed until the irritability of habit which induced this unpleasant state is allayed. In such cases, the blistering plaster should not be allowed to remain on longer than is requisite to raise the cuticle: but if ulceration have commenced, the best local application is a warm emollient poultice; and bathing the denuded surface frequently with tepid milk and water: while at the same time cinchona bark is internally administered.

EMPLASTRUM CANTHARIDIS COMPOSITUM, Edin. *Compound Plaster of Spanish Flies.*

"Take of Venice turpentine, *four ounces and a half;* Burgundy pitch and cantharides, of each, *three ounces;* bees' wax, *one ounce;* verdigris, *half an ounce;* white mustard seed, and black pepper, of each, *two drachms.* Liquefy the wax and Burgundy pitch, add the turpentine, and, while the mixture is hot, sprinkle into it the remaining articles, previously in fine powder, and mixed together. Stir the whole briskly, as it concretes in cooling."

This plaster is not, like the former, a mere mechanical compound; but it is, in part, a chemical one. The heat should not exceed 212°, as the cantharidin is volatile. This plaster is intended to raise a blister more quickly than the former; hence it is adapted for cases of gout and cramps of the stomach, in which the effect of the blister must be almost instantly produced. Its operation is accompanied with great pain, and a pungent sense of heat: it is apt to cause very unpleasant ulceration if allowed to remain too long applied.[1] Many different opinions are entertained as to the value of this plaster.

EMPLASTRUM CUMINI, Lond. *Plaster of Cummin.*

"Take of cummin, carraway, bay berries, of each, *three ounces,*

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[1] Blisters are rapidly raised by a solution made by digesting cantharides in acetic ether, in the proportion of ʒj. of the powdered flies to fl ℥ of the ether. They are still more quickly raised by the application of boiling water.

prepared Burgundy pitch, *three pounds;* wax, *three ounces;* olive oil and water, of each, *a fluid ounce and a half.* To the pitch and wax, melted together, add the dry constituents, rubbed to powder, then the oil and water; and evaporate to a proper consistence."

A revival from an old Pharmacopœia. Use the same as Emplastrum Picis, — a stimulant application.

EMPLASTRUM FERRI, Lond. Edin. Dub. *Plaster of Iron.*

"Take of sesquioxide of iron, *an ounce;* lead plaster, *eight ounces;* prepared frankincense, *two ounces.* Sprinkle the sesquioxide into the plaster and frankincense melted together over a slow fire, and mix."

Edinburgh.

"Take of litharge plaster, *three ounces;* resin, *six drachms;* olive oil, *three fluid drachms and a half;* bees' wax, *three drachms;* red oxide of iron, *one ounce.* Triturate the oxide of iron with the oil, and add the mixture to the other articles, previously liquefied by gentle heat. Mix the whole thoroughly."

Dublin.

"Take of peroxide of iron, in fine powder, *one ounce;* Burgundy pitch, *two ounces;* litharge plaster, *eight ounces.* Add the peroxide of iron to the Burgundy pitch and litharge plaster, previously melted together, and stir the mixture constantly until it stiffens on cooling."

These plasters are supposed to be tonic, and are used in muscular relaxations, and weakness of the joints after sprains; but they act by affording mechanical support to the parts.

EMPLASTRUM GALBANI, Lond. *Galbanum Plaster.*

"Take of prepared galbanum, *eight ounces;* plaster of lead, *three pounds;* turpentine, *an ounce;* prepared frankincense, *three ounces.* Add first the frankincense, then the plaster, melted over a slow fire, to the galbanum and turpentine melted together, and mix the whole."

EMPLASTRUM GUMMOSUM, Edin. *Gum Plaster.*

"Take of litharge plaster, *four ounces;* ammoniac, galbanum, and bees' wax, of each, *half an ounce.* Mix the gum-resins together, and strain them; melt also together the plaster and

wax; add the former to the latter mixture, and mix the whole thoroughly."

These plasters are stimulant and suppurative. They are applied with advantage to scrofulous tumours; to joints long affected with arthritic pains; and to the loins in rickets; as a suppurative to excite indolent tumours, and reduce the induration which often remains around discharged abscesses.

EMPLASTRUM HYDRARGYRI, Lond. Edin. Dub. *Mercurial Plaster.*

"Take of mercury, *three ounces;* plaster of lead, *a pound;* olive oil, *a fluid drachm;* sulphur, *eight grains.* Add the sulphur gradually to the heated oil, stirring constantly with a spatula until they unite; afterwards rub the mercury with them until the globules disappear; then add by degrees the lead plaster melted with a slow fire, and mix the whole."

Edinburgh.

"Take of mercury, *three ounces;* litharge plaster, *six ounces;* olive oil, *nine fluid drachms;* resin, *one ounce.* Liquefy the oil and the resin; let them cool; add the mercury, and triturate till its globules disappear; then add to the mixture the plaster, previously liquefied; and mix the whole thoroughly."

Dublin.

"Take of mercury, *six ounces;* litharge plaster, *twelve ounces;* oil of turpentine, *one fluid ounce;* resin, *two ounces.* Dissolve the resin in the turpentine with the aid of heat; add the mercury, and rub them together until the metallic globules cease to be visible, and the mixture assumes a dark grey colour; then add the litharge plaster, previously melted, and stir the mixture constantly until it stiffens on cooling."

Syn. Quecksilberpflaster (*G.*).

The mercury in these plasters is probably in the state of minute division; and the sulphur ordered in the London formula, and oil, are intended to diminish the labour required for the reduction of the metal. The plasters are powerful discutients, and are applied to buboes, venereal tumours, nodes, when they are not very painful to the touch, and indurations; they are also applied to joints affected with obstinate syphilitic pains.

EMPLASTRUM LITHARGYRI, Edin. Dub. *Plaster of Litharge.* See *Emplastrum Plumbi.*

EMPLASTRUM OPII, Lond. Edin. Dub. *Plaster of Opium.*

"Take of extract of opium, *an ounce;* prepared frankincense, *two ounces;* lead plaster, *eight ounces;* boling water, *a fluid ounce.* To the liquefied frankincense add the plaster, melted over a slow fire, and the extract, first mixed with the water; constantly stirring, evaporate, over a slow fire, to a proper consistence."

Edinburgh.

"Take of powder of opium, *half an ounce;* Burgundy pitch, *three ounces;* litharge plaster, *twelve ounces.* Liquefy the plaster and pitch; add the opium by degrees, and mix them thoroughly."

Dublin.

"Take of opium, in very fine powder, *one ounce;* resin plaster, *nine ounces.* Melt the plaster by means of a steam or water bath; then add the opium by degrees, and mix thoroughly."

Syn. Opiumspflaster (*G.*).

This plaster is anodyne, and supposed to be useful in relieving rheumatism and local pains: but although it is undoubtedly certain that opium, in that state in which it exists in the tincture, or when it is dissolved in oil, produces an anodyne effect on the system when externally applied, yet we doubt whether the anodyne properties of this plaster are such as to sanction its employment. The Edinburgh preparation contains only one third the amount of opium of the other two.

EMPLASTRUM PICIS[1], Lond. Edin. *Pitch Plaster.*

"Take of prepared Burgundy pitch, *two pounds;* prepared frankincense, *a pound;* resin, wax, of each, *four ounces;* expressed oil of nutmeg, *an ounce;* olive oil, water, of each, *two fluid ounces.* Add the oils and water to the frankincense, pitch, resin, and wax, previously melted together; then, constantly stirring, evaporate to a proper consistence.

Edinburgh.

"Take of Burgundy pitch, *one pound and a half;* resin and bees' wax, of each, *two ounces;* oil of mace, *half an ounce;* olive oil, *one fluid ounce;* water, *one fluid ounce.* Liquefy the pitch, resin, and wax with a gentle heat; add the other articles; mix them well together; and boil till the mixture acquire the proper consistence."

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[1] Emplastrum Picis compositum, P. L. 1824.

These plasters are stimulant and rubefacient. They are used in pulmonary affections, applied to the thorax; and in headache and chronic ophthalmia, applied to the temples. When a serous exudation takes place, the plaster should be frequently renewed.

EMPLASTRUM PLUMBI, Lond. *Lead Plaster.*

"Take of oxide of lead, rubbed to a very fine powder, *six pounds;* olive oil, *a gallon;* water, *two pints.* Boil them together over a slow fire, stirring constantly until the oil and oxide of lead cohere into the consistence of a plaster. It will be necessary, however, to add a little boiling water, if nearly the whole of that which was employed in the beginning shall be consumed before the end of the boiling."

EMPLASTRUM LITHARGYRI, Edin. Dub. *Plaster of Litharge.*

"Take of litharge, in fine powder, *five ounces;* olive oil, *twelve fluid ounces;* water, *three fluid ounces.* Mix them; boil and stir constantly, until the oil and litharge unite, replacing the water if it evaporate too far."

Dublin.

"Take of litharge, in very fine powder, *five pounds;* olive oil, *one gallon;* water, *two pints.* Boil all the ingredients together over a gentle fire, stirring constantly until the oil and litharge acquire such consistence that they will solidify on cooling. Towards the close of the process a little boiling water should be added, to supply the place of that which has disappeared."

Syn. Emplâtre diachylon (*F.*). Bleipflaster (*G.*).

The use of the water in the formation of these plasters is to moderate the heat of the mixture, until the oil and the oxide combine, by which means the reduction of the metal is prevented; a circumstance which is apt to take place from the strong attraction of the oil for oxygen at a high temperature. By continuing the boiling, the water is dissipated; and the temperature can then be increased to a sufficient degree to give the plaster the necessary consistence. The water should be previously made hot; as cold water is apt to produce an explosion. When long kept, these plasters change their colour, and lose most of their sensible properties. They are intended chiefly to defend excoriated surfaces from the action of the air; and to form the basis of some other plasters.

EMPLASTRUM POTASSII IODIDI, Lond. *Plaster of Iodide of Potassium.*

"Take of iodide of potassium, *one ounce;* prepared frankincense,

six ounces; wax, *six drachms;* olive oil, *two fluid drachms.* To the frankincense and wax, melted together, add the iodide, first triturated with the oil, and stir constantly until they cool. This plaster is to be spread on linen rather than leather."

A form for the external application of the iodide: it is supposed to possess the property of increasing absorption of the parts to which it is applied.

EMPLASTRUM RESINÆ, Lond. Dub. *Resin Plaster.*

"Take of resin, *half a pound;* lead plaster, *three pounds.* Melt the lead plaster with a gentle heat; then add the resin, also melted, and mix."

Dublin.

"Take of resin, in powder, *four ounces;* Castile soap, in powder, *two ounces;* litharge plaster, *two pounds.* To the litharge plaster, previously melted over a gentle fire, add the resin and soap, and mix them intimately."

EMPLASTRUM RESINOSUM, Edin. *Resinous Plaster.*

"Take of litharge plaster, *five ounces;* resin, *one ounce.* Melt them together with a moderate heat; and stir the mixture well till it concretes in cooling."

Syn. Harzigtes Bleipflaster (*G.*).

These plasters are defensive, adhesive, and gently stimulant. They are used for retaining together the lips of recent wounds, when it is wished to heal them by the first intention; to support ulcerated parts: and to assist their granulation and cicatrization, according to the excellent method of Mr. Baynton. The plaster, however, originally used by Mr. Baynton contained less resin: ℥ vj. only being added to lb. j. of the litharge plaster; but this preparation answers the purpose equally well, except in very irritable habits. The best substance for spreading it on is calico; and it is of some importance to spread it equally, and thin; to effect which the calico must be stretched, and the plaster, melted and beginning to cool, must be poured on one end of it, and equally extended over the whole surface by means of a spatula, held nearly horizontally, with one edge of the blade raised to an angle of 45 degrees: or it may be still more equally done by passing the calico, on which the fluid plaster has been poured, through a machine formed of a straight blade of steel, fixed by screws, at a proper distance from a polished plate of the same metal. It is sold ready spread.

EMPLASTRUM SAPONIS, Lond. Edin. Dub. *Soap Plaster.*

"Take of soap, sliced, *half a pound;* lead plaster, *three pounds;* resin, *an ounce.* To the plaster, melted by a slow heat, add the soap and resin, first liquefied; then, constantly stirring, evaporate to a proper consistence."

Edinburgh.

"Take of litharge plaster, *four ounces;* gum plaster, *two ounces;* Castile soap, in shavings, *one ounce.* Melt the plasters together with a moderate heat; add the soap; boil for a little."

Dublin.

"Take of Castile soap, in powder, *four ounces;* litharge plaster, *two pounds and a half.* To the plaster, previously melted over a gentle fire, add the soap, and heat them together until they are thoroughly incorporated."

Syn. Seifenpflaster (*G.*).

Soap plaster is discutient; and is applied to lymphatic tumours: but it is much less useful than the mercurial plaster.

EMPLASTRUM SIMPLEX, Edin. *Simple Plaster.*

"Take of bees' wax, *three ounces;* suet and resin, of each, *two ounces.* Melt them together with moderate heat, and stir the mixture briskly till it concretes on cooling."

Sometimes used for dressing blistered parts, but now seldom employed.

ENEMATA.

CLYSTERS.

ENEMA ALOES, Lond. *Clyster of Aloes.*

"Take of aloes, *two scruples;* carbonate of potassa, *fifteen grains;* decoction of barley, *half a pint.* Mix and rub them together."

This is a useful stimulant enema for dislodging ascarides.

ENEMA ASSAFŒTIDÆ, Lond. *Assafœtida Clyster.*

"Take of assafœtida (prepared), *a drachm;* decoction of barley,

half a pint. Rub the assafœtida with the decoction, added by degrees until they are thoroughly mixed."

Used for the same purposes as the Enema Fœtidum.

ENEMA CATHARTICUM, Edin. Dub. *Purging Clyster.*

"Take of olive oil, *one ounce;* sulphate of magnesia, *half an ounce;* sugar, *one ounce;* senna, *half an ounce;* boiling water, *sixteen fluid ounces.* Infuse the senna for an hour in the water, then dissolve the salt and sugar; add the oil, and mix them by agitation."

Dublin.

"Take of sulphate of magnesia, *one ounce;* olive oil, *one fluid ounce;* mucilage of barley, *sixteen fluid ounces.* Dissolve the sulphate of magnesia in the mucilage; add the oil, and mix."

A useful purgative enema for general purposes.

ENEMA COLOCYNTHIDIS, Lond. *Clyster of Colocynth.*

"Take of extract of colocynth, *half a drachm;* soft soap, *an ounce;* water *a pint.* Mix, and rub them together."

Used in colics and obstinate constipation.

ENEMA FŒTIDUM, Edin. Dub. *Fœtid Clyster.*

Add to the cathartic enema two drachms of tincture of assafœtida.

Dublin.

"Take of tincture of assafœtida, *two fluid drachms;* warm water, *twelve ounces.* Mix."

This and the assafœtida enema of the London College are used as antispasmodics, to relieve colic from flatulence: they are especially adapted for hysterical subjects.

ENEMA OPII, Lond. ENEMA OPII VEL ANODYNUM, Edin. *Clyster of Opium.*

"Take of tincture of opium, *thirty minims;* decoction of starch, *four fluid ounces.* Mix."

Edinburgh.

"Take of starch, *half a drachm;* tincture of opium, *half a fluid drachm to one fluid drachm;* water, *two fluid ounces.* Boil the

starch in the water; and when it is cool enough for use, add the tincture of opium."

The only use of this formula is to fix the quantity of the opium and the fluid.

ENEMA TABACI, Lond. Edin. Dub. *Clyster of Tobacco.*

"Take of tobacco, *a scruple;* boiling water, *half a pint.* Macerate for an hour, and strain."

Edinburgh.

"Take of tobacco, *fifteen grains to half a drachm;* boiling water, *eight fluid ounces.* Infuse for half an hour, and then strain."

Dublin.

"Take of tobacco leaf, *one scruple;* boiling water, *eight ounces.* Infuse for one hour in a covered vessel, and strain."

Much caution is required in using this powerful sedative enema: if it depress too much, solution of ammonia and brandy should be freely administered.

ENEMA TEREBINTHINÆ, Lond. Edin. Dub. *Clyster of Turpentine.*

"Take of oil of turpentine, *a fluid ounce;* yolk of *one* egg; decoction of barley, *nineteen fluid ounces.* Rub the oil with the yolk of egg, and add the decoction gradually."

Edinburgh.

"Take of oil of turpentine, *one fluid ounce;* yolk of egg, *a sufficiency;* water, *nineteen fluid ounces.* Rub the oil and yolk carefully together, and then add the water gradually."

Dublin.

"Take of oil of turpentine, *one fluid ounce;* mucilage of barley, *sixteen fluid ounces.* Mix."

This is a useful clyster in cases of peritonitis, and in erysipelas of the head. It has been proposed to substitute half a pint of olive oil for the barley water, in cases of ascarides. The oil of olives alone is a useful enema in such cases.

EXTRACTA.

EXTRACTS.[1]

THESE are preparations obtained by evaporating aqueous and alcoholic solutions of vegetable substances, until a mass of a somewhat firm, tenacious consistence remains. When water has been employed for making the solution, the extract may consist of gum or mucilage, albumen, extractive, and saccharine matter, in conjunction with the active principles, and other salts which the vegetable contained, and is termed a *Watery Extract;* but if alcohol have been the menstruum, resin, extractive, and also some of the above matters, may be the ingredients, and the extract is denominated a *Spirituous Extract.* The latter appellation also is used if proof spirit be employed. The proper menstruum, therefore, for the preparation of any extract must be that fluid which most readily dissolves the peculiar principles on which the medicinal efficacy of the vegetable is supposed to depend.

When water is employed, the substance to be subjected to its action should be in the dried state, and coarsely powdered; and the solution, whether made by decoction or infusion, should be evaporated immediately after it is strained, and whilst it is yet hot; for, as we observed in treating of decoctions, water at the temperature of 212° takes up much more of the active matter of vegetables than it can hold in solution at a lower temperature; therefore by allowing them to cool, with the view of defecation, and evaporating the clear fluid only, a considerable portion of the active matter does not enter into the extract, and is necessarily lost. In performing the evaporation, a higher temperature than that of boiling water must not be employed; but it must, nevertheless, be conducted as quickly as possible; and, therefore, the evaporating vessel should be broad and shallow, and set in boiling water; or the water-bath recommended by Dr. Powell should be employed. (See *Instruments*, Part I.) The method of preparing extracts in vacuo, introduced by Mr. Barry, is a great improvement; and certainly, if the presence of air is likely to alter the properties of extracts, considerable advantages will accrue from Mr. Barry's mode of conducting the evaporation.[2]

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[1] Chemists are much divided as to the nature of the substances to which the term *Extract* can be chemically applied; the term, therefore, as used in this work and in the pharmacopœias, is confined solely to preparations obtained in the manner described under the title, without reference to their chemical properties.

[2] For a description of the apparatus Mr. Barry employs, see *Journal of Science and the Arts*, vol. viii. p. 360.

Spirit is used only in cases where the active ingredient of the vegetable is chiefly resin, or where it is too volatile to bear the heat which is necessary for evaporating the water without being dissipated, or without suffering some decomposition, which would materially alter its properties. A tincture of the substance may be first obtained without heat by percolation; and then evaporated by a very gentle heat in a water-bath; but the spirit need not be lost, since, by employing a distilling apparatus, the greater part of it may be again obtained, either altogether free from any vegetable matter, or containing a small portion only of the more volatile principles, which renders it fitter for being again employed for the preparation of the same kind of extract. In some instances the spirit requires to be boiled on the materials, which occasions great waste if means be not taken to prevent it. To effect this, the mattrass containing the materials should be attached to Liebig's refrigeratory reversed (See Part I.); and a receiver attached to receive any spirit that may pass.

Whether water, proof spirit, or pure alcohol be employed, the medicinal properties of the extract are always in some degree injured; the volatile parts are dissipated, and some of the fixed parts decomposed by the degree of heat required for the evaporation, — particularly if the water be the menstruum. Such are some of the objections to these preparations, as they are usually found in the shops; but well prepared, they are excellent medicines. As a general rule, they should be made by expressing the juice from the recently gathered vegetable, just getting into full flower, and inspissating this expressed juice as rapidly as possible by exposing it in thin strata to a current of very dry air. Practical experiments have fully demonstrated the advantage this process possesses over all others at present in use; for it was shown that 10 grains of conium extract, thus prepared, were more than equal to 20 grains of that prepared in vacuo, and more than equal to 60 grains of that prepared by the process of boiling down the juice to an extract.[1]

Extracts require to be kept in a hard and a soft state. A hard extract should be in such a state as to admit of its being easily pulverized, and the soft extract should be such as to retain the round form of a pill, without the addition of any powder. Both kinds should be preserved in pots which are so close that all the external air can be excluded; and these should be kept in a dry place. The soft should be wrapped in oiled bladder, and kept also in close covered pots.

The London College does not arrange extracts under the titles *Watery* and *Spirituous;* nor does it distinguish them by the terms

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[1] The best extracts which I have seen are prepared in this manner by Mr. Squire, of Oxford Street, the chemist to the Queen.

Simple and *Resinous.* It classes the inspissated juices, which require no menstrua, as extracts. The following general directions are given by the LONDON COLLEGE for the preparation of extracts: —

"In preparing all kinds of extracts, unless otherwise directed, evaporate the fluid as quickly as possible in a broad, shallow dish placed in a water-bath, until the extract acquire a consistence proper for forming pills; and, towards the end of the operation, stir assiduously with a spatula."

The EDINBURGH COLLEGE recommends the evaporation of decoctions, infusions, and tinctures in a water-bath; and it adds, "the extracts of expressed juices cannot, perhaps, be better prepared than by spontaneous evaporation in shallow vessels, exposed to a current of air."

EXTRACTUM ACONITI, Lond. Edin. *Extract of Aconite* or *Wolfsbane.*

"Take of the fresh leaves of aconite, *a pound.* Bruise them in a stone mortar, then express the juice, and, without any depuration, evaporate it to a proper consistence."

Edinburgh.

"Take the fresh leaves of aconite, *any convenient quantity.* Beat them into a pulp; express the juice; subject the residuum to percolation with rectified spirit, so long as the spirit passes materially coloured: unite the expressed juice and the spirituous infusion; filter; distil off the spirit; and evaporate the residuum in the vapour-bath, taking care to remove the vessel from the heat as soon as the due degree of consistence shall be attained."

Syn. Extrait d'Aconit (*F.*), Eisenhütlein-extrakt (*G.*), Estratto d'Aconito Napello (*I.*).

This extract, or inspissated juice, is the form under which Stoerk introduced aconite into practice. It has an obscure, brownish-red colour, a disagreeable odour, and an acrid slightly styptic taste. Its medicinal properties are the same as those of the plant, but it is more energetic, especially when it is prepared with rectified spirit. Dr. Lombard found it a powerful sedative in hypertrophy of the heart[1]; and in acute rheumatism. I have successfully prescribed it in neuralgic pains. The dose at first should be gr. $\frac{1}{2}$ only, gradually increased to grs. iv., taken night and morning. The Edinburgh preparation is stronger than the London.

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[1] *Brit. and Foreign Med. Rev.* i. 240.

EXTRACTUM ALOES, Lond. EXTRACTUM ALOES AQUOSUM, Dub. *Extract of Aloes. Watery Extract of Aloes.*

"Take of socotrine aloes, *fifteen ounces;* boiling distilled water, *a gallon.* Macerate for three days with a gentle heat, then strain, and set aside the solution, that the dregs may subside. Pour off the clear liquor, and evaporate it to a proper consistence."

Dublin.

"Take of hepatic aloes, in coarse powder, *four ounces ;* water, *two pints.* Boil the aloes until it is dissolved; when the solution is cold, and the dregs have subsided, pour off the clear liquid, and evaporate it to a proper consistence."

EXTRACTUM ALOES BARBADENSIS, Lond. *Extract of Barbadoes Aloes.*

"Prepare this in the same way as the extract of aloes."

Syn. Extrait d'Aloës (*F.*), Alöe-extrakt (*G.*), Estratto d'Aloe (*I.*).

These extracts consist chiefly of the extractive matter of the aloes; but during the inspissation it is partially oxidized and rendered less soluble; consequently, the extract is not completely soluble in water. It is employed in the same cases as the aloes, and is said to be less stimulant and griping. The dose is from grs. iij. to grs. xv., given in the form of pills.

EXTRACTUM ANTHEMIDIS[1], Edin.

"Take of chamomile, *a pound.* Boil it with a gallon of water down to four pints; filter the liquor hot; evaporate in the vapour-bath to the due consistence."

Syn. Extrait de Camomille Romaine (*F.*), Kamillen extrakt (*G.*), Estratto di Fiori di Camomillo (*I.*).

In this process the volatile oil is dissipated, and a simple bitter extract remains, possessing scarcely any of the fragrant properties of the plant. The extract is of a deep brown colour, and has a grateful bitter taste, but scarcely any odour. It has little efficacy when used alone; but is a useful adjunct to rhubarb and sulphate of zinc, in stomachic pills. Conjoined with the oil of chamomile, it

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[1] Extractum chamæmeli, P. L. 1787.

displays all the influence of the flowers. The dose may be from grs. x. to ℈j., given twice or thrice a day.

EXTRACTUM BELLADONNÆ, Lond. Edin. Dub. *Extract of Belladonna.*

"Take of fresh leaves of belladonna, *a pound.* Bruise them in a stone mortar, then express the juice, and, without any separation of the sediment, evaporate it to a proper consistence."

Edinburgh.

"Take of belladonna, fresh, *any convenient quantity.* Bruise it in a marble mortar into a uniform pulp; express the juice; moisten the residuum with water, and express again. Unite the expressed fluids, filter them, and evaporate the filtered fluid in the vapour-bath to the consistence of firm extract, stirring constantly towards the close."

Dublin.

"Take of fresh belladonna leaves, collected when the plant begins to flower, *any convenient quantity.* Crush them in a mortar, express the juice, and allow it to stand for twenty-four hours. Pour off the clear liquor, and set it aside for subsequent use; and having placed the sediment on a calico filter, wash it with an equal bulk of distilled water, and mix the washings with the decanted liquor. When, by the application of a water heat, coagulation has occurred, skim off the coagulated matter, filter the hot liquid through flannel: mix in now the washed sediment, and evaporate to the consistence of a firm extract, by a steam or water bath, constantly stirring, particularly towards the close of the evaporation."

Syn. Extrait de Belladonne (*F.*). Belladonna-extrakt (*G.*), Estratto de l'erba di Belladonna (*I.*).

This extract is inodorous, and has a bitterish taste. Its medicinal properties are the same as those of the plant, but weaker. They depend on an alkaloid, which has been named *Atropia.* We have witnessed benefit from extract of belladonna in hooping-cough, in combination with carbonate of soda; but it requires to be exhibited with great caution. A plaster, composed of equal parts of the extract and carbonate of ammonia, or of soap plaster, is efficacious in relieving local pains. An ointment, also made with equal proportions of the extract and simple ointment, is useful in allaying the pain of chordee; and the extract rubbed on the affected part has been found a useful means of procuring tempo-

rary relief from the pain of neuralgia. A little of it rubbed upon the eyelid dilates the pupil; hence it has been found useful in the operation for cataract. The dose for an adult is from gr. $\frac{1}{4}$, gradually increased to gr. ij., given in the form of pills. In cases of hooping-cough in children, the dose is $\frac{1}{10}$ of a grain, gradually augmented. This extract, when taken in very large doses, produces all the symptoms of a powerful narcotic poison. The most striking are dilatation and immobility of the pupils, confused vision, or insensibility to the impression of external objects; the vessels of the conjunctiva appearing as if injected with blue blood; dryness of the lips, the tongue, the palate, and fauces. Sometimes there is difficult deglutition, nausea, syncope, frequent flexion of the body forward, continual movements of the hands and fingers, lively delirium, with an idiotic smile, difficulty of articulation, and a kind of tenesmus. If these effects subside, the healthy functions are restored, but every recollection of the previous condition is lost. Sometimes the patient passes into a state of fatuity, livid spots appear on different parts of the body, the pulse sinks, the intestines become paralyzed, profuse colliquative sweats break forth, and death supervenes.

Dissections display signs of inflammation of the mucous coat of the alimentary canal, sometimes proceeding to ulceration; the liver and lungs are more or less inflamed, and the latter gorged with black blood. The body rapidly passes into putrefaction.

The remedies in poisoning by belladonna or its extract are, after removing the poison by the stomach syringe, affusions of cold water on the head and body, acidulated drinks, vomiting and purging.

EXTRACTUM CANNABIS INDICUS PURIFICATUM, Dub. *Purified Extract of Indian Hemp.*

"Take of extract of Indian hemp of commerce, *one ounce;* rectified spirit, *four fluid ounces.* Dissolve the extract in the spirit, and when the dregs have subsided, decant the clear liquid, and evaporate, by means of a water-bath, to the consistence of a soft extract."

Rectified spirit is the best menstruum for taking up the active portion of the hemp. Mr. Squire[1] states that the extract so prepared from the fresh plant in India is three times the strength of that prepared from the imported plant. Dose of the extract gr. $\frac{1}{2}$ to gr. iv. or more. See *Cannabis Indica,* Part II.

EXTRACTUM CINCHONÆ, Lond. Edin. *Extract of Cinchona Bark.*

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[1] *Squire on the Pharmacopœias,* 1851.

"Take of yellow cinchona, coarsely bruised, *three pounds;* distilled water, *six pints.* Add four pints of water to the cinchona, and stir constantly with a spatula until the bark has become soaked; macerate for twenty-four hours, and strain; then evaporate the mixed liquor to a proper consistence."

Edinburgh.

"Take of any of the varieties of cinchona, but especially the yellow or red cinchona, in fine powder, *four ounces;* proof spirit, *twenty-four fluid ounces.* Percolate the cinchona with the spirit; distil off the greater part of the spirit; and evaporate what remains in an open vessel over the vapour-bath to a due consistence."

EXTRACTUM CINCHONA PALLIDÆ, Lond. *Extract of Pale Bark.*

EXTRACTUM CINCHONÆ RUBRÆ, Lond. *Extract of Red Bark.*

"Prepare these in the same manner in which extract of cinchona bark is ordered to be prepared."

Syn. Extrait de Quinquina (*F.*), Wäss rigtes China-extrakt (*G.*), Estratto di China aquosa (*I.*).

The operation of the same causes as those which we stated to be unfavourable to decoction, as a form of preparation for the exhibition of cinchona, are still more hurtful to its efficacy in the form of extract; and, according to Sir John Pringle, the extract is less efficacious, even in equal quantities, than the simple powder; but the extract is less apt to derange the stomach; and it certainly contains salts of cinchonia and quina. They are usually ordered in doses of from grs. v. to ʒ ss., dissolved in any distilled water; but it is necessary to observe, that, owing to the oxidizement of the extractive matter, the solubility of the extracts is diminished during their formation; scarcely more than one-half of them is soluble in water. They have a very bitter taste, but less austere than the barks. The spirituous extract of the Edinburgh College is preferable to the aqueous extracts of the London.

EXTRACTUM COLCHICI, Lond. *Extract of Meadow Saffron.*

"Take of fresh colchicum corm, *one pound.* Take away the

outer coat, and complete the process in the manner in which it has been ordered concerning extract of aconite."

EXTRACTUM COLCHICI ACETICUM, Lond. Edin. Dub. *Acetic Extract of Meadow Saffron.*

"Take of fresh meadow saffron corm, *a pound;* acetic acid, *three fluid ounces.* Bruise the corm, the outer coating being removed, gradually sprinkling them with acetic acid; then press out the juice, and, unstrained, evaporate to a proper consistence."

Edinburgh.

"Take of the bulb of colchicum, *a pound;* pyroligneous acid, *three fluid ounces.* Beat the colchicum to a pulp, gradually adding the acid; express the liquid, and evaporate it in a porcelain vessel (not glazed with lead) over the vapour-bath to the due consistence."

Dublin.

"Take of colchicum root, dried, *four ounces;* dilute acetic acid, *eight fluid ounces.* Digest the root in the acid for fourteen days; then filter, and evaporate, by means of a water-bath, to the consistence of a soft extract."

These extracts may be used in the same cases as the other preparations of colchicum, namely, in gout and rheumatism: but I have found the wine of the seeds more serviceable than either of them. The dose is from gr. j. to grs. iv. every third or fourth hour.

EXTRACTUM COLOCYNTHIDIS, Lond. Edin. *Extract of Colocynth.*

"Take of colocynth, cut in pieces, the seeds being removed, *three pounds;* distilled water, *half a gallon.* Macerate the colocynth for thirty-six hours, frequently pressing it with the hand. Strongly press out the liquor, and strain; lastly, evaporate to a proper consistence."

Edinburgh.

"Take of colocynth, *a pound;* water, *two gallons.* Boil gently for six hours, frequently adding distilled water, that it may always be the same measure. Strain the liquor while hot, and evaporate it in the vapour-bath to the due consistence."

Syn. Koloquinthen-extrakt (*G.*).

This extract is a milder but less powerful cathartic than the

pulp, from which it is prepared, and, with the addition of calomel, forms an excellent purgative pill, which operates without griping. It has however the disadvantage of becoming extremely tough when kept. From grs. v. to grs. x. is the usual dose.

EXTRACTUM CONII, Lond. Edin. Dub. *Extract of Hemlock.*

"To be prepared in the same manner as the extract of aconite."

Edinburgh.

"Take of conium, *any convenient quantity;* beat it into a uniform pulp in a marble mortar; express the juice, and filter it. Let this juice be evaporated to the consistence of a very firm extract, either in a vacuum, with the aid of heat, or spontaneously, in shallow vessels exposed to a strong current of air, freed of dust by gauze skreens. This extract is of good quality only when a very strong odour of conia is disengaged by degrees on its being carefully triturated with aqua potassæ."

Dublin.

"Take of fresh hemlock leaves, collected when the plant begins to flower, *any convenient quantity.* The method of preparation is the same as for *Extractum Belladonnæ.*"

Syn. Extrait de Cigue (*F.*), Schierlings-extrakt (*G.*), Estratto del' erba della Cicuta (*I.*).

This extract should be of a clear deep-green colour. It should have a bitterish, saline taste, and disengage a powerful odour of conia when rubbed with pure potassa. One cwt. of hemlock leaves yields from three to five lbs. of extract.[1] Although it be the form in which Stoerk introduced hemlock into practice, yet the narcotic power of the remedy is always impaired by this mode of preparation; and it is still more weakened by keeping, being nearly lost when a saline efflorescence begins to appear on the surface of the extract. It varies in its power according to the soil where the plant grows, and the seasons. It is used in the same cases as the powder, with which it is frequently mixed when it is to be made into pills; and is a useful adjunct to mercurials in cutaneous affections. I have given it in the manner of Stoerk, and to the same extent, in carcinomatous affections, with most decided

[1] *Brande's Manual*, p. 394.

advantage. Dr. John Davey employed it in combination with tartar emetic in pneumonia, accompanied with so much debility as to forbid the use of the lancet. Bergius recommends it in impotency.[1] The dose is gr. iij., gradually increased to gr. x., given twice or thrice a day.[2]

The extract, when good, should contain conia: and it is useless if it do not evolve the odour of it when tested with potassa.

EXTRACTUM DIGITALIS, Edin. *Extract of Foxglove.*

"It is prepared in the same manner as the extract of conium."

This extract appears to be unnecessary; and it is a more uncertain form of the medicine than the powder. The dose is from gr. ss. to grs. ij. or more.

EXTRACTUM ELATERII, Lond. Edin. (See MOMORDICA ELATERIUM.) *Extract of Elaterium.*

Syn. Elaterium (*F.*), Estratto del frutto della Momordica (*I.*).

"Take of wild cucumber, *a pound.* Slice wild cucumber in the long direction and strain the juice very gently; express through a very fine hair-sieve; then set it aside for some hours until the thicker part has subsided. Reject the thinner supernatant fluid, and dry the thicker portion with a gentle heat."

Edinburgh.

"Take of the fruit of Momordica elaterium before it is quite ripe, *any convenient quantity;* cut the fruit and express the juice gently through a fine sieve; allow the liquid to rest till it becomes pretty clear; pour off the supernatant liquor, which may be thrown away; and dry the feculence with a gentle heat."

ELATERIUM, Dub. (Formerly Extractum Elaterii.)

"Take of the fruit of Momordica elaterium before it is quite ripe, *any convenient quantity:* cut the fruit, and express the juice gently through a fine sieve; allow the liquid to rest until it becomes pretty clear, pour off the supernatant liquor, which may be thrown away, and dry the feculence with a gentle heat."

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[1] "Impotentiam virilem sub usu conii curatam observavi, in viro quodam plusquam quadragenario, qui omnem erectionem penis perdiderat, postinde tamen plures liberos procreavit."— *Bergius Nat. Med.* i. 195.

[2] John Hunter proved its poisonous property by giving ʒj. of it for a dose. The patient discontinued the remedy for a few days, and then recommenced it, with half the dose; but it proved fatal.

The substance obtained by these processes is neither an extract nor an inspissated juice, but a peculiar combination of fecula and green resin, with *elaterin*, the active principle of the fruit; it is therefore surprising, that the London and Edinburgh Colleges term it *extractum elaterii*. Elaterium is contained in the juice which surrounds the seeds only; and it subsides from this juice, obtained without pressure. From Dr. Clutterbuck's experiments[1], the quantity of elaterium in the fruit appears to be so small, that he obtained six grains of it only from forty pepoes. It is often adulterated with starch, on which account we seldom obtain two samples of it of the same strength. When good, elaterium is of a pale-greenish colour, has a peculiar odour, and a bitter taste, is lighter than water, and pulverulent. It should not effervesce with diluted hydrochloric acid, which is the case when it is adulterated with chalk; the acid solution then yields a precipitate with oxalate of ammonia. The Edinburgh College gives the following as the properties of good elaterium:—"Colour pale grey; when exhausted by rectified spirit, the solution, concentrated and poured into hot and diluted aqua potassa, deposits on cooling, minute silky, colourless crystals, weighing from a seventh to a fourth of the elaterium."

Medical properties and uses.—Elaterium is a very powerful hydragogue, and excites sickness, severe vomiting, and hypercatharsis, if it be not cautiously administered. On this account it is seldom used as a cathartic; but in ascites it causes the entire evacuation of the fluid, when gamboge, and bitartrate of potassa, foxglove, and every other remedy have failed. The best mode of administering it is to give it in doses of from gr. $\frac{1}{10}$, combined with one grain or more of calomel, every sixth hour, until it begin to operate, and then extend the intervals.

EXTRACTUM GENTIANÆ, Lond. Edin. Dub. *Extract of Gentian.*

"Take of gentian, sliced, *three pounds;* distilled water, *six pints.* Macerate for twelve hours in four pints of water; pour off and strain the liquor. Add two pints of water to the remainder, macerate for six hours, gently press out the liquor, and strain. Lastly, evaporate the mixed liquors to a proper consistence."

Edinburgh.

"Take of gentian root, *any convenient quantity;* bruise it to a

[1] *London Med. Repos.* vol. xii.

moderately fine powder; mix it thoroughly with half its weight of distilled water; in twelve hours put it into a proper percolator, and exhaust it by percolation with temperate distilled water; concentrate the liquid, filter before it becomes too thick, and evaporate in the vapour-bath to a due consistence."

Dublin.

"Take of gentian root in thin slices, *one pound;* distilled water, *three pints.* Macerate the gentian in one pint and a half of the water for six hours, then strain and express. Add to the residue the remaining pint and a half of water, macerate again for six hours, strain and express. Finally, mix the liquors, and evaporate by a steam or water bath to a proper consistence."

Syn. Extrait de Gentiane (*F.*), Enzian-extrakt (*G.*), Estratto di Gentiana (*I.*).

The bitter principle of gentian root is not injured by this form of preparation. The extract is inodorous, very bitter, black, shining, and tenacious. It is tonic; but it is chiefly used as a vehicle for the exhibition of the metallic oxides. It has the property of destroying the emetic quality of ipecacuanha. The dose is from grs. x. to ʒ ss., given twice or thrice a day. Mr. Squire states that three pounds of root yield one pound of extract.

EXTRACTUM GLYCYRRHIZÆ, Lond. Edin. Dub. *Extract of Liquorice.*

"Take of fresh bruised liquorice, *two pounds and a half;* boiling distilled water, *two gallons.* Macerate for twenty-four hours; then boil down to a gallon. Strain the hot liquor, and evaporate to a proper consistence."

The Edinburgh and Dublin Colleges order this extract to be prepared in the same manner as the extract of gentian of their own pharmacopœias.

There is scarcely any of this extract prepared by the apothecary, the greater part of it being imported from Spain and Sicily, where it is prepared in the following manner: — The roots, when three years old, are dug up, washed, then crushed in an olive-mill, which presses out the juice, in the same way as oil from olives. The roots are then boiled for four or five hours, again pressed in the olive press, and the whole juice is lastly slowly boiled in an iron vessel to a proper consistence, and moulded into rolls. The pure extract of liquorice, sold in the shops under the name of *refined liquorice,* is prepared from the impure extract of commerce, by dissolving it in water, straining and inspissating it in the usual manner. It is a useful demulcent for allaying tickling cough, as from its tenacity it hangs about and sheathes the fauces.

EXTRACTUM HÆMATOXYLI[1], Lond. Edin. *Extract of Logwood.*

"Take of cut logwood, *two pounds and a half;* boiling distilled water, *two gallons.* Prepare the extract in the same manner as it has been ordered concerning extract of liquorice."

Edinburgh.

"Take of logwood, in fine chips, *a pound;* boiling water, *a gallon.* Macerate for twenty-four hours; then boil down to four pints; strain, and concentrate in the vapour-bath to the due consistence."

Syn. Campecheholz-extrakt (*G.*).

One cwt. of the wood yields 20 lbs. of the extract.[2] This extract is almost inodorous, has a sweet austere taste, and a deep ruby colour. It becomes extremely brittle when kept.

It is regarded as useful in the protracted stage of diarrhœa and dysentery. The dose is from grs. x. to ʒ ss., dissolved in cinnamon water or peppermint water. It is incompatible with alkalies.

EXTRACTUM HYOSCYAMI, Lond. Edin. Dub. *Extract of Henbane.*

Syn. Extrait de Jusquiame (*F.*), Hyoszyamus extrakt (*G.*), Estratto di Giusquiams nera (*I.*).

"Prepared in the same manner as the extract of aconite."

Edinburgh.

"This extract is to be prepared from the fresh leaves of hyoscyamus by any of the processes directed for extract of conium."

Dublin.

"Take of fresh hyoscyamus leaves, collected when the plant begins to flower, *any convenient quantity.* The method of preparation is the same as for *Extractum Belladonnæ.*"

According to Geiger, one pound of the leaves yields from eight to ten drachms of extract. It should be prepared without heat; by spontaneous evaporation in shallow vessels.

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[1] Extractum Ligni Campachensis, P. L. 1745.

[2] *Brande's Manual,* p. 397.

This extract has a disagreeable, slightly fœtid, peculiar odour, and a nauseous, bitterish, subsaline taste. It should have a bright green colour. It is possessed of considerable narcotic powers, and is used as a substitute for opium in nervous affections, mania, gout, rheumatism, and all painful complaints in which it is wished to avoid the costiveness which opium is apt to induce. In combination with colocynth, it augments the purgative and diminishes the griping properties of that drug. A solution of it in water, in the proportion of one drachm to the ounce, dropped into the eye, very much dilates the pupil; and has been used, on the recommendation of Professor Himly, for facilitating the operation of cataract: and also in contracted pupils not accompanied by adhesion of the iris to the capsule.[1] For this purpose it certainly possesses no advantage over extract of belladonna, and its operation is much weaker. The dose is from grs. ij. to ℈ ss., given in the form of pills.

EXTRACTUM JALAPÆ[2], Lond. *Extract of Jalap.*

"Take of jalap, powdered, *two pounds and a half;* rectified spirit, *a gallon;* distilled water, *two gallons.* Macerate the jalap in the spirit for four days, and decant the tincture. Boil the residue in the water to half a gallon. Then strain separately the tincture and the decoction; distil the former, and evaporate the latter, until both begin to thicken. Lastly, mix the extract with the resin, and evaporate to a proper consistence.

"This extract should be kept *soft,* fit for forming pills, and *hard* that it may be reduced to powder."

EXTRACTUM sive RESINA JALAPÆ, Edin. *Extract of Jalap.*

"Take *any convenient quantity* of jalap, in moderately fine powder; mix it thoroughly with enough of rectified spirit to moisten it well; put it for twelve hours into a percolator, and exhaust the powder with rectified spirit; distil off the greater part of the spirit, and concentrate the residuum over the vapour-bath to a due consistence."

Syn. Extrait de Jalap (*F.*).

One cwt. of jalap yields about 50 lbs. of watery extract, and fifteen of resinous extract; the latter of which is the most active.[3] These extracts contain all the active principles of the jalap root. They are, however, apt to gripe during their operation: hence, particularly when given to children, they should be triturated with sugar and almonds, or mucilage, so as to form an emulsion, in which

[1] *Edin. Medical and Surg. Journal*, vol. ix. pp. 6, 11.

[2] Extractum Jalapii, P. L. 1745.

[3] *Brande's Manual*, p. 400.

state they operate freely, and without griping. The dose, to an adult, is from grs. x. to ℈ j.

EXTRACTUM KRAMERIÆ, Edin.

"This extract is to be prepared from krameria root, in the same way with that of liquorice root." A good and powerful astringent. The dose is ℈ j. to ℈ ij.

EXTRACTUM LACTUCÆ, Lond. *Extract of Lettuce.*

"It is prepared in the same manner as extract of aconite."

Syn. Extrait de Laitue (*F.*).

One cwt. of lettuce yields between four and five lbs. of the extract.[1]

This extract is exhibited as a substitute for opium in cases in which the intention is rather to allay irritation than to produce the full effect of a narcotic. It is, however, a bad mode of obtaining the narcotic properties of the lettuce. The dose is from grs. iij. to grs. vj., and more, gradually increased.[2]

EXTRACTUM LUPULI, Lond. Edin. *Extract of Hops.*

"Take of hops, *two pounds and a half;* boiling distilled water, *two gallons.* It is to be prepared in the same manner as the extract of liquorice (of logwood, E.)."

One cwt. of the strobiles yields about 40 lbs. of the extract.[3] This extract is inodorous; but has the bitter taste peculiar to the hop. We have found it a useful but very weak anodyne in gout, acute rheumatism, and cases which do not admit of the use of opium. The dose is from grs. v. to ℈ j., given in the form of pills, or dissolved in any aqueous vehicle.

EXTRACTUM NUCIS VOMICÆ, Lond. Edin. *Extract of Koochla Nut,* or *Nux Vomica.*

"Take of koochla nut (nux vomica), *eight ounces;* rectified spirit, *three pints.* Apply watery vapour to the nux vomica, so that it may be softened; afterwards bruise the same, cut into thin slices, and dry it; then macerate in two parts of spirit for seven days; press out the tincture, and strain what remains; macerate

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[1] *Brande's Manual*, p. 400.

[2] The proper juice, collected by incisions into the flowering stem when the plant is in flower, is preferable to this extract. A good plant of garden lettuce will yield ʒ ss. of dried juice; one of L. *virosa* will yield ʒ j. of the same, which is called Lactucarium.

[3] *Brande's Manual*, p. 398.

again in the remaining spirit for three days; then again press and strain. Let the greater part of the spirit distil from the tinctures, mixed together; let what remains be evaporated to a proper consistence."

Edinburgh.

"Take of nux vomica, *any convenient quantity;* expose it in a proper vessel to steam, till it is completely softened, slice it, dry it thoroughly, and immediately grind it in a coffee-mill: exhaust the powder either by percolating it with rectified spirit, or by boiling it with repeated portions of rectified spirit, until the spirit comes off free of bitterness. Distil off the greater part of the spirit, and evaporate what remains in the vapour-bath to a proper consistence."

The spirit extracts from the nux vomica all the active properties, — viz. the strychnate or igasaurate of strychnia and brucia.

Medical properties and uses. — This extract may be given in cases where nux vomica or strychnia are indicated, in doses varying from $\frac{1}{3}$ gr. to 2 or 3 grs.

EXTRACTUM OPII, Lond. Edin. *Extract of Opium.*

"Take of pounded opium, *a pound and a half;* distilled water, *five pints.* Add gradually to the opium *two pints and a half* of water, and macerate for twenty-four hours, frequently stirring with a spatula; then strain. Macerate what remains in the remaining water for twenty-four hours, and strain. Lastly, evaporate the strained liquors to a proper consistence."

Edinburgh.

"Take of opium, *one pound;* water, *five pints.* Cut the opium into small fragments, macerate it for twenty-four hours in a pint of water; break down the fragments with the hand, express the liquid with pretty strong pressure; break down the residuum again in another pint of water; let it macerate for twenty-four hours, and express the liquid; repeat the maceration and expression in the same way till all the water is used. Filter the successive infusions as they are made, passing them through the same filter; unite and evaporate them in the vapour-bath to the due consistence."

EXTRACTUM OPII AQUOSUM, Dub. *Watery Extract of Opium.*

"Take of opium, *one pound;* water, *six pints.* Cut the opium into thin slices, macerate it for twenty-four hours in a quart of the water, and decant. Macerate the residuum for twelve hours with a second quart of water, subjecting the insoluble residuum to strong expression. Filter the successive infusions and expressed liquor, and evaporate them in a water-bath to a proper consistence."

Syn. Extrait d'Opium (F.), Opiums-extrakt (*G.*), Estratto d'Oppio (*I.*).

Cold water extracts from opium all the morphia in the form of a meconate; it also takes up the remaining alkaloids and some other principles. Most of the narcotina, and other useless and resinous matters, are left in the dregs.

Qualities. — This extract is inodorous, has a bitter taste, and is of a very deep-brown colour. It is not altogether soluble in water; but it is not precipitated from its solution by alcohol. It however affords precipitates with the following substances, — viz. solutions of astringent vegetables, ammonia if not in excess, the alkaline carbonates, bichloride of mercury, sulphate of copper, sulphate of zinc, acetate and diacetate of lead, and nitrate of silver.

Medical properties and uses. — This extract produces the effects of opium, but it is supposed with less subsequent derangement of the nervous system. It is therefore considered to be well adapted for the diseases of children; and those with very irritable habits. The dose is from gr. j. to grs. ij., for an adult.

EXTRACTUM PAPAVERIS, Lond. Edin. *Extract of Poppies.*

"Take of the capsules of the poppy, freed from the seeds, and bruised, *fifteen ounces;* boiling distilled water, *a gallon.* Macerate for twenty-four hours; then boil down to four pints; strain the hot liquor, and evaporate it (by the vapour-bath, *E.*) to a proper consistence."

Syn. Extrait de Pavot (*F.*).

This extract possesses nearly the same medicinal properties as opium, or its extract, but in a much weaker degree. The dose is from grs. ij. to gr. x. given in the form of pills.

EXTRACTUM PAREIRÆ, Lond. Edin. *Extract of Pareira.*

"It is prepared in the same manner as the extract of logwood (as extract of liquorice, *E.*)." This extract possesses the diuretic properties of the plant, and has been found useful in catarrhus vesicæ, and other diseases of the urinary organs. It may be administered in combination with narcotics and demulcents; or to augment the power of the decoction of Pareira. The dose is from grs. x. to ʒ ss.

EXTRACTUM QUASSIÆ, Edin. *Extract of Quassia.*

"This extract is to be prepared from quassia, in the same way with the extract of liquorice."

A simple bitter. The dose is grs. v. to grs. xv.

Syn. Estratto della Quercia (*I.*).

EXTRACTUM RHEI, Lond. Edin. Dub. *Extract of Rhubarb.*

"Take of rhubarb root, in powder, *fifteen ounces;* proof spirit, *a pint;* distilled water, *seven pints.* Macerate for four days, then strain, and set it apart, that the feculencies may subside. Pour off the liquor, and evaporate it when strained to a proper consistence."

Edinburgh.

"Take of rhubarb, *one pound;* water, *five pints.* Cut the rhubarb into small fragments; macerate it for twenty-four hours in three pints of the water; filter the liquor through a cloth, and express it with the hands, or otherwise moderately macerate the residuum with the rest of the water for twelve hours at least; filter the liquor with the same cloth as before, and express the residuum strongly. The liquors, filtered again if necessary, are then to be evaporated together to a proper consistence in a vapour-bath. The extract, however, is obtained of finer quality by evaporation in a vacuum with a gentle heat."

Dublin.

"Take of rhubarb, in thin slices, *one pound;* water, *five pints.* Macerate the rhubarb for twenty-four hours in three pints of the water, filter the liquor through a cloth, and express; macerate the residuum with the rest of the water for twelve hours, filter the liquor through the cloth previously used, and express the residuum strongly. The liquors, filtered again if necessary, are to be mixed, and evaporated to a proper consistence in a water-bath."

Syn. Extrait de Rhubarbe (*F.*), Rhabarber-extrakt (*G.*).

Although the purgative properties of the rhubarb be obtained to a certain degree in this extract, yet its virtues are certainly impaired during the inspissation; and the simple infusion is in every respect a preferable form of preparation. An extract, however, of great power may be prepared by forming Turkey rhubarb into a pulp, then pressing and evaporating the solution quickly in dry air; or in vacuo. It is of a deep golden hue, with all the odour of the rhubarb. The dose is from grs. v. to ʒ ss., given in the form of pills.

EXTRACTUM SARSÆ LIQUIDUM, Lond. EXTRACTUM SARSÆ FLUIDUM, Edin. EXTRACTUM SARSAPARILLÆ FLUIDUM, Dub. *Fluid Extract of Sarsaparilla.*

"Take of sarsaparilla, *three pounds and a half;* distilled water, *five gallons;* rectified spirit, *two fluid ounces.* Boil the sarsaparilla in three gallons of water down to twelve pints; pour off the liquor and strain while yet hot. Again boil the sarsaparilla in the remaining water, down to half, and strain: evaporate the mixed liquors to eighteen fluid ounces, and, when the extract has cooled, add to it the spirit."

Edinburgh.

"Take of sarza, in chips, *one pound;* boiling water, *six pints.* Digest the root for two hours in four pints of the water; take it out, bruise it, replace it, and boil for two hours; filter and squeeze out the liquid; boil the residuum in the remaining two pints of water, and filter and squeeze out this liquor also; evaporate the united liquors to the consistence of thin syrup; add, when the product is cool, as much rectified spirit as will make in all sixteen fluid ounces. Filter.

"This fluid extract may be aromatized with volatile oils or warm aromatics."

Dublin.

"Take of sarsaparilla, *one pound;* boiling water, *eight pints;* rectified spirit, *as much as is sufficient.* Digest the sarsaparilla in five pints of the water for two hours, at a temperature near 212°, and then decant. Add the rest of the water, digest again for two hours, and decant. Evaporate the mixed liquors by a steam or water heat to the consistence of a thin syrup, and, when the product has cooled, add as much rectified spirit as will make the entire twenty ounces."

This preparation is now introduced into the London Pharmacopœia, and resembles the fluid extracts of the Edinburgh and Dublin Colleges, except in strength. It will be seen that the London extract is about three times stronger than the other. It would have been well had the College introduced a fluid *compound* extract, as several preparations purporting to have that nature are extensively employed in practice. Jamaica sarza yields much more extract than the other species.

Dose ʒ ss. to ʒ j. or more of London extract; of Edinburgh or Dublin, ʒ iss. to ʒ iij., given in cases where the decoction would be useful, or as an addition to the decoctions of sarza.

EXTRACTUM SIVE RESINA SCAMMONII, Edin. *Extract or Resin of Scammony.*

"Take *any convenient quantity* of scammony, in fine powder; boil it in successive portions of proof spirit till the spirit ceases to dissolve any thing; filter; distil the liquid till little but water passes over. Then pour away the watery solution from the resin at the bottom; agitate the resin with successive portions of boiling water till it is well washed; and, lastly, dry it at a temperature not exceeding 240°."

Mr. Squire remarks, in his work on the Pharmacopœias, that good scammony would be deteriorated by this process, and that, if adulterated with guaiacum and some other gum resins, they would still be retained in this extract. It is in thin, transparent, brownish lamina, which are fusible and combustible, and exhale a peculiar odour. Caustic potassa deepens the colour of its solution; which yields precipitates with acetate of lead. According to Mr. Johnson, its formula is $C_{40} H_{33} O_{20}$; the quantity of oxygen being very remarkable. It is a drastic cathartic in doses of gr. v. to gr. xij.

EXTRACTUM STRAMONII, Lond. Edin. *Extract of Thorn Apple.*

"Take of thorn-apple seeds, *fifteen ounces;* boiling distilled water, *one gallon.* Macerate for four hours in a lightly-covered vessel near the fire; afterwards take out the seeds; bruise them in a stone mortar, and put them again into the liquor. Then boil to four pints, and strain the liquor while hot. Lastly, evaporate it to a proper consistence."

Edinburgh.

"Take of seeds of stramonium, *any convenient quantity;* grind them well in a coffee-mill; rub the powder into a thick mass with proof spirit; put the pulp into a percolator, and transmit proof spirit till it passes colourless; distil off the spirit, and evaporate what remains in the vapour-bath to a proper consistence."

By the Edinburgh process a stronger and altogether superior extract is obtained; the London preparation is very apt to become mouldy by keeping. The active principle in the extract is *daturine.* Dose, gr. ½ to grs. ij. upwards.

EXTRACTUM STYRACIS, Edin. *Extract of Storax.*

"Take *any convenient quantity* of storax, in fine powder; exhaust it by boiling it in successive qnantities of rectified spirit; filter the spirituous solutions; distil off the greater part of the

spirit; evaporate the remainder over the vapour-bath to the consistence of a thin extract."

This extract is very unimportant: it enters into the preparation of the compound storax pill. It is similar to the styrax præparata of the London Pharmacopœia.

EXTRACTUM TARAXACI, Lond. Edin. *Extract of Dandelion.*

To be prepared by the same process as directed for preparing extract of liquorice."

Edinburgh.

"Take of fresh root of taraxacum, *a pound;* boiling water, *a gallon.* Proceed as for the preparation of extract of poppy-heads."

Syn. Lowenzahn-extrakt (*G.*), Estratto di Tarassaco (*I.*).

The medicinal powers of dandelion have been already noticed. The extract should be made by pressing the proper juice from the recent roots taken up in autumn, and inspissating it rapidly in dry air. The extract is then of a brownish-yellow colour, of an agreeable odour, and has a bitter acidulous taste. Dr. Pemberton affirms, that he has seen great advantage result from the use of this extract in doses of ʒss. in chronic inflammation and incipient scirrhus of the liver, and in chronic derangement of the stomach.[1] It has, indeed, a powerful influence on the secreting powers of the liver. The usual dose is from grs. x. to ʒj., united with sulphate of potassa.

EXTRACTUM UVÆ URSI, Lond. *Extract of Bear's Wortleberry.*

"To be prepared in the same manner as the extract of hop."

This extract is regarded as a useful form of administering Uva Ursi in affections of the bladder and kidneys, with phosphatic deposits. It may be combined with all the narcotics except opium.

The dose is grs. vj. to ʒ ss.

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[1] *On Diseases of the Abdominal Viscera,* p. 43.

INFUSA.

INFUSIONS.

THESE are solutions of vegetable matter, obtained by maceration of vegetable substances either in cold or in boiling water. As in the case of decoction, the substance must be sliced or bruised if in a recent state, or pulverized if dry, in order to expose a large surface to the action of the menstruum. The term *infusion*, in pharmaceutical language, is confined to watery solutions.

The substances which water, without the aid of boiling, can extract from vegetable matter submitted to its action, are gum, mucus, extractive, tannic and other acids, the bitter and narcotic principles, &c.; a range, which includes most of the principles on which the medicinal properties of plants depend. These, also, are less liable to be altered by infusion than by decoction; and, consequently, this form of preparation is to be preferred in every instance to which it is applicable. The strength and quality of the infusions are varied by the degree of temperature of the water: those made with hot water being necessarily stronger; but, particularly in the case of bitters, cold infusions are more grateful.

In making infusions, when heat is required, the vessel is to be placed near the fire, so that the temperature of the water may be kept up to the necessary point for a sufficient length of time to produce the effect intended. Perhaps it might be an advantage, were the external surface of infusion-pots covered with a metallic coating, and polished; by which, as the heat would be much more slowly radiated than from the vessels usually employed, the effect of it would be more uniform and certain in promoting the solvent powers of the water.

Infusions, like decoctions, are liable to undergo spontaneous decomposition, if kept even for a few days; and therefore the Colleges have properly directed that not more than a pint be made at one time: thus regarding them as extemporaneous preparations.

INFUSUM ANGUSTURÆ. See *Infusum Cuspariæ.*

INFUSUM ANTHEMIDIS, Lond. Edin. Dub. *Infusion of Chamomile.*

"Take of chamomile, *five drachms;* boiling distilled water, *a pint.* Macerate for ten minutes (twenty minutes, *Edin.*) in a lightly-covered vessel, and strain."

Dublin.

"Take of chamomile flowers, dried, *half an ounce;* boiling water, *twelve ounces.* Infuse for fifteen minutes, in a covered vessel, and strain. The product should measure about *eight ounces.*"

This infusion is clear, of a pale yellow colour, and has the odour and taste of the flowers. It precipitates solution of isinglass, whitish; infusion of yellow cinchona bark, white; solution of sulphate of iron and of tincture of sesquichloride of iron, black; solution of nitrate of silver, white; of bichloride of mercury, pale brown; and of acetate and diacetate of lead, yellowish-white. These substances, therefore, are incompatible in prescriptions with this infusion.

Medical properties and uses.—This infusion is a good stomachic and tonic; and may be given in dyspepsia and other complaints attended with debility of the stomach, in doses of from f ℥ j. to f ℥ ij. two or three times a day. When exhibited warm it excites nausea, and is, therefore, occasionally employed to assist the operation of emetics.

INFUSUM ARMORACIÆ COMPOSITUM, Lond.
Compound Infusion of Horse-radish.

"Take of horse-radish sliced, mustard seed, bruised, of each, *an ounce;* compound spirit of horse-radish, *one fluid ounce;* boiling distilled water, *a pint.* Macerate the root and seeds in the water for two hours in a lightly-covered vessel, and strain; then add the compound spirit of horse-radish."

This infusion, after it is strained, deposits by rest a whitish feculent matter, which should be separated. The supernatant clear part is of a sulphur-yellow colour, and holds, dissolved in every fluid ounce, rather more than grs. x. of solid matter. It has a very pungent odour, and a hot, biting taste; precipitates infusion of galls, yellowish; and infusion of yellow cinchona bark, white. The solutions of the pure alkalies do not affect it; but with their carbonates whitish precipitates are produced; bichloride of mercury and nitrate of silver also cause precipitates; hence all these substances, except the pure alkalies, are incompatible in formulæ with this infusion. It soon spoils in hot weather, and emits an offensive odour.

Medical properties and uses.—This is not an unusual form of giving horse-radish, the stimulant and diuretic properties of which are aided by that of the mustard. It is particularly serviceable in paralysis, and in dropsies occurring after intermittents. The dose is from f ℥ j. to f ℥ iij., given three or four times a day.

INFUSUM AURANTII COMPOSITUM, Lond. Dub. INFUSUM AURANTII, Edin. *Compound Infusion of Orange-peel.*

London and Edinburgh.

"Take of dried orange-peel, *half an ounce;* lemon-peel, *two drachms;* cloves bruised, *one drachm;* boiling distilled water, *a pint.* Macerate for fifteen minutes in a lightly-covered vessel, and strain."

Dublin.

"Take of bitter orange-peel, dried, *three drachms;* cloves, bruised, *half a drachm;* boiling water, *half a pint.* Infuse for half an hour in a covered vessel, and strain. The product should measure about eight ounces."

This infusion has the agreeable odour and taste of the ingredients from which it is made; is clear, and has the hue of deep-coloured sherry wine, when the directions of the College are strictly followed: but it becomes muddy and nauseous if it be left without straining for some hours. It precipitates sulphate of iron black; and also produces precipitates with acetate and diacetate of lead, infusion of yellow cinchona bark, and lime-water.

Medical properties and uses. — It is an excellent and grateful stomachic. The dose may be from f ℥ j. to f ℥ ij., given twice or thrice a day.

INFUSUM BUCHU, Lond. Edin. Dub. *Infusion of Buchu.*

"Take of buchu, *an ounce* (half ounce, Dub.); boiling distilled water, *a pint* (half-pint, Dub.). Infuse for four hours (two hours, Edin., one hour, Dub.) in a covered vessel, and strain. (The product should measure about eight ounces, Dub.)."

This infusion is warm and aromatic, owing to the large quantity of volatile oil in the glands of the leaves.

Medical properties and uses. — It is a light tonic, stimulant and diuretic; and has been found useful in diarrhœa and during the decline of dysentery. The dose is f ℥ jss. to f ℥ ij.

INFUSUM CALUMBÆ, Lond. Edin. Dub. *Infusion of Calumba.*

"Take of calumba, sliced, *five drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

Edinburgh.

"Take of calumba, in coarse powder, *half an ounce;* cold water,

about a pint. Triturate the calumba with a little of the water, so as to moisten it thoroughly; put it into a percolator, and transmit cold water through it till sixteen fluid ounces of infusion be obtained."

Dublin.

"Take of calumba root, in coarse powder, *three drachms;* cold water, *nine ounces.* Macerate for two hours, and strain. The product should measure about eight ounces."

The active matter of calumba is not all extracted by water. The infusion is inodorous, and tastes bitter. It is clear, of a pale-brown colour, and affords precipitates with infusion of yellow cinchona bark, lime-water, and solution of bichloride of mercury, which, therefore, ought not to be ordered in conjunction with it. This infusion soon spoils; but not so soon when it is made by the percolator. The London College orders boiling water, which dissolves some starch.

Medical properties and uses. — Infusion of calumba is a good stomachic bitter in dyspeptic cases; for restraining the nausea and vomiting which occur in pregnancy, and the severe diarrhœa and vomiting which often attend dentition. The dose may be from f ℥ jss. to f ℥ iij.

INFUSUM CARYOPHILLI, Lond. Edin. Dub. *Infusion of Cloves.*

"Take of bruised cloves, *three drachms* (*two drachms,* D.); boiling distilled water, *a pint* (*nine ounces,* D.). Macerate for two hours (one hour, D.) in a lightly-covered vessel, and strain (through linen or calico, E.). (The product should measure about eight ounces, D.)."

This infusion contains all the active matter of the cloves. It is of a deep, clear, brown colour, has an aromatic odour, and a bitterish aromatic taste: it affords precipitates with infusion of yellow cinchona bark, the strong acids, lime-water, sulphate and other salts of iron, sulphate of zinc, acetate and diacetate of lead, and nitrate of silver. It also decomposes potassio-tartrate of antimony.

Medical properties and uses. — It is a warm, grateful stomachic; and may be advantageously used in dyspepsia, from the abuse of ardent spirits, accompanied with a sensation of coldness at the stomach; in chronic gout, and flatulent colic. The dose is from f ℥ jss. to f ℥ ij., three or four times a day.

INFUSUM CASCARILLÆ, Lond. Edin. Dub. *Infusion of Cascarilla.*

"Take of cascarilla bark, bruised, *an ounce and a half* (℥ j., D.); boiling distilled water, *a pint* (*half a pint,* D.). Macerate for two

hours (one hour, D.) in a lightly-covered vessel, and strain (through linen or calico, E.). (The product should measure about eight ounces, D.)"

This is a clear, pale, reddish-brown infusion, having the aromatic odour of the bark, and a bitterish, aromatic taste. It is incompatible with the following substances, which it precipitates; namely, lime-water, infusion of galls, infusion of yellow cinchona bark, solutions of nitrate of silver, acetate and diacetate of lead, sulphate of zinc, and salts of iron, which are slowly thrown down, of a pale olive colour.

Medical properties and uses. — It is a slight stimulant and tonic; and is advantageously given in some alvine fluxes, particularly such as occur after measles; and in the aphtha gangrenosa of infants. In combination with carbonate of soda, it is an excellent tonic in those affections of children which are dependant on a weak state of the digestive organs, and are accompanied with acidity. The dose is from f ℥jss. to f ℥ iij.

INFUSUM CATECHU COMPOSITUM, Lond. Dub. *Compound Infusion of Catechu.*

"Take of powder of catechu, *six drachms* (*three drachms,* D.); cinnamon, bruised, *a drachm* (*half a drachm,* D.); boiling distilled water, *a pint* (*nine ounces,* D.). Macerate for an hour (half an hour, D.) in a lightly-covered vessel, and strain. (The product should measure about eight ounces, D.)"

INFUSUM CATECHU, Edin. *Infusion of Catechu.*

"Take of powdered catechu, *six drachms*; cinnamon bark, powdered, *a drachm*; syrup, *three fluid ounces;* boiling water, *seventeen fluid ounces.* Infuse the catechu and cinnamon with the water for two hours; then strain through linen, and add the syrup."

Syn. Infusion de Cachou (*F.*), Katechu infusum (*G.*), Infusio di Cato (*I.*).

In these formulæ it is intended that the whole of the soluble matter in the catechu taken up by the boiling water should remain dissolved after the infusion cools; but a considerable portion is deposited. When the extract is triturated with water at 212°, as much of it is dissolved as the water can hold in solution, so that a preparation similar to this infusion may be immediately made by simply triturating the materials together. The syrup ordered by the Edinburgh College prevents the preparation from keeping longer than two or three days, although without the syrup it will keep good for months.

Qualities. — This infusion is inodorous, has a slightly bitter, austere taste; and leaves, even when it contains no syrup, an agreeable sweetness in the mouth. The colour, when the pale catechu is used, is a light brown; but when the dark catechu is

employed, a deep red brown. The following substances which precipitate its tannic acid, or otherwise alter its properties, ought not to be ordered in formulæ with it: namely, solution of gelatin, infusion of the cinchona barks, and their alkaloids, tincture of opium, the strong acids, salts of iron and of zinc, bichloride of mercury, tartar emetic, and acetate and diacetate of lead. The alkalies deepen the colour, and destroy the astringency of the infusion.

Medical properties and uses. — This infusion, which is a powerful, agreeable astringent, is the best form under which catechu can be prescribed: it is very useful in long-continued diarrhœas, proceeding from a weakened condition of the intestines. The dose is from f ℥ j. to f ℥ iij., given after every liquid dejection, or every four hours.

INFUSUM CHIRETTÆ, Edin. Dub. *Infusion of Chiretta.*

"Take of chiretta, *four drachms;* boiling water, *one pint.* Infuse for two hours, and strain through linen or calico."

Dublin.

"Take of chiretta, bruised, *two drachms;* boiling water, *nine ounces and a half.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

Medical properties and uses. — An excellent bitter vehicle for alkalies and the salts of iron in atonic dyspepsia and convalescences. The dose is f ℥ ij. thrice a day.

INFUSUM CINCHONÆ, Lond. Edin. Dub. *Infusion of Cinchona Bark.*

Syn. Infusion de Quinquina (*F.*), Chinainfusum (*G.*), Infuso di China (*I.*).

"Take of yellow cinchona, bruised, *an ounce;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

Edinburgh.

"Take of any species of cinchona, according to prescription, *one ounce,* in powder; boiling water, *one pint.* Infuse for four hours in a covered vessel, and then strain through linen or calico."

Dublin.

"Take of Peruvian bark (crown or pale), in coarse powder, *one ounce;* boiling water, *half a pint.* Infuse for one hour in a covered vessel, and filter through paper. The product should measure about eight ounces."

These infusions contain a portion of kinate of cinchonia, or of quina, according to the kind of cinchona bark which is used. Its

strength is considerably augmented when f ʒ j. of diluted sulphuric acid is added to the boiling water before it is poured on the powdered bark. An infusion made with this addition contains a greater quantity of the alkaloid than the ordinary infusion. This infusion is slightly turbid, has a pale, pinkish-yellow colour, evolves more of the aromatic odour of the bark than the decoction, and has an equal degree of bitterness and astringency. It ferments, spontaneously, in the course of a few days during summer. It affords precipitates with the alkaline carbonates, lime-water, the salts of iron, and of zinc, nitrate of silver, bichloride of mercury, arsenious acid, acetate and diacetate of lead, carbonate of potassa, and tartar emetic; the aqueous infusions and decoctions of chamomile flowers, calumba, cascarilla, horse-radish, cloves, catechu, orange-peel, foxglove, senna, rhubarb, valerian, simaruba, and elm bark.

Any considerable portion of the tinctures also produces precipitates in this infusion. Some of these take place immediately, others not till after several hours have elapsed: the febrifuge virtue of the infusion is not destroyed by them, but the mixtures are certainly rendered inelegant. Sulphuric acid destroys the bitterness of the infusion, but not its astringency; and adds considerably to its efficacy.

Medical properties and uses. — The cinchona in this form agrees better with most stomachs than when in powder; but its powers are necessarily diminished. It is chiefly serviceable in dyspepsia, and convalescences, particularly after the maturation of the pustules in ecthyma *vulgare.* The dose is from f ℥ j. to f ℥ ij., three or four times a day.

INFUSUM CINCHONÆ SPISSATUM, Lond. *Concentrated Infusion of Cinchona.*

"Take of coarsely bruised yellow cinchona, *three pounds;* distilled water, *six pints*; rectified spirit, as much as may be necessary. Macerate the cinchona in the same manner as we directed Extract of Cinchona to be prepared, and strain. Evaporate the mixed infusions in a water-bath to the fourth part, and place aside that the dregs may settle. Pour off the clean liquor, and strain what remains. Then mix them, and again evaporate, until the specific gravity of the liquors be 1·200. To this, when it is cooled, drop in the spirit by degrees, so that three fluid drachms may be added to each fluid ounce of the liquor. Lastly, set aside the liquor for twenty days, that the dregs may entirely subside."

This preparation, as well as the Infusum Cinchonæ Pallidæ Spissatum, are fluid extracts of the barks, and resemble the "Liquors" of Mr. Battley. They are very costly preparations; and we do not see that they possess any particular advantages; except being in a very concentrated state. Dose ♏ xx., which,

according to Dr. Wood, of Philadelphia, would contain the virtues of about one drachm of bark.

INFUSUM CINCHONÆ PALLIDÆ, Lond. *Infusion of Pale Bark.*

"Prepare this in the same manner in which we ordered the Infusion of Cinchona to be prepared."

INFUSUM CINCHONÆ PALLIDÆ SPISSATUM. Lond. *Concentrated Infusion of Pale Bark.*

"Prepare this in the same manner in which we ordered the Concentrated Infusion of Cinchona to be prepared."

INFUSUM CUSPARIÆ, Lond. Edin. *Infusion of Cusparia.*

"Take of cusparia, bruised, *five drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain (through linen or calico, Edin.)."

Medical properties and uses. — This infusion possesses the stimulant and tonic properties of the bark, and is a useful form of administering it in typhoid fevers, obstinate bilious diarrhœa, and in dysentery, after proper evacuations. The tincture of cinnamon covers its taste, and makes it sit lighter on the stomach. The dose is from f ℥ j. to f ℥ iij., given every three or four hours.

INFUSUM DIGITALIS, Lond. Edin. Dub. *Infusion of Foxglove.*

"Take of dried foxglove leaves, *a drachm;* spirit of cinnamon, *a fluid ounce;* boiling distilled water, *a pint.* Macerate the foxglove leaves for four hours in a lightly-covered vessel, and strain; then add the spirit."

Edinburgh.

"Take of digitalis, dried, *two drachms;* spirit of cinnamon, *two ounces;* boiling water, *eighteen fluid ounces.* Infuse the digitalis in the water, in a covered vessel, for four hours; strain through linen or calico; and then add the spirit of cinnamon."

Dublin.

"Take of foxglove leaves, dried, *one drachm;* boiling water, *nine ounces.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

Syn. Infusion de Digitale purpurine (*F.*), Fingerhut aufguss (*G.*), Infuso di Digitale porporina (*I.*).

The faint odour and nauseous bitter taste of the foxglove are covered by the spirit of cinnamon. The solution of sulphate of iron slowly throws down in these infusions a pale olive-green pre-

cipitate: acetate and diacetate of lead and infusion or decoction of yellow cinchona bark produce instantaneous and copious precipitates. The London infusion is only half the strength of the other two.

Medical properties and uses.— These infusions do not differ materially from that made by the formula of Withering, and are well calculated to obtain, speedily, the diuretic effects of the remedy. The dose is from f ℥ ss. to f ℥ j. of the London preparation, given twice a day; or every eight hours, if the patient be strong, and the symptoms very urgent. For the necessary cautions to be observed in administering them, see the article *Digitalis.*

INFUSUM DIOSMÆ, Lond. Edin. Dub. See *Infusum Buchu.*

INFUSUM ERGOTÆ, Dub. *Infusion of Ergot.*

"Take of ergot of rye, in coarse powder, *two drachms;* boiling water, *nine ounces.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

Dose, f ℥ j. to f ℥ ij.; repeated in a short time, if necessary.

INFUSUM GENTIANÆ COMPOSITUM, Lond. Dub. *Compound Infusion of Gentian.*

"Take of gentian, sliced, orange-peel, dried, of each, *two drachms;* fresh lemon peel, *four drachms;* boiling distilled water, *a pint.* Macerate for an hour in a lightly-covered vessel, and strain."

"Take of gentian root, bruised, orange-peel, dried, of each, *two drachms;* boiling water, *half a pint.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

INFUSUM GENTIANÆ, Edin. *Infusion of Gentian.*

"Take of gentian root, sliced, *half an ounce;* bitter orange-peel, dried and bruised, *one drachm;* coriander, bruised, *one drachm;* proof spirit, *four fluid ounces;* cold water, *sixteen fluid ounces.* Pour the spirit upon the solids; in three hours add the water; and in twelve hours more strain through linen or calico."

The spirit ordered by the Edinburgh College is intended to aid the solvent power of the water, and to preserve the infusion, which in summer soon becomes ropy and spoils; but as infusions can always easily be prepared, and boiling water takes up the greater part of the active matter of the ingredients, the spirituous addition, and the length of time ordered for the maceration, are certainly objectionable. The formulæ of the London and Dublin

Colleges are free from both these objections, and produce a clear infusion of a yellowish colour, with the agreeable odour of the orange-peel, and a pleasant bitter taste. The London infusion is half the strength of the other two.

Medical properties and uses. — These infusions are very commonly used, and are elegant tonics and stomachics. They are given in dyspepsia and chlorosis, united with chalybeates, or with alkalies; in atonic gout and diarrhœa, with absorbents and aromatics; in jaundice, with rhubarb and saline purgatives; and in dropsies, with squills, and neutral salts. From f ℥ j. to f ℥ ij. may be given for a dose, three or four times a day.

INFUSUM JUNIPERI, Dub. *Infusion of Juniper.*

"Take of juniper berries, bruised, *one ounce;* boiling water, *half a pint.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces." Dose, f ℥ ij. to f ℥ iij. Given when juniper is required.

INFUSUM KRAMERIÆ, Lond. Dub. *Infusion of Krameria.*

"Take of rhatany, *an ounce;* boiling distilled water, *a pint.* Macerate for four hours in a lightly-covered vessel, and strain."

Dublin.

"Take of rhatany root, bruised, *half an ounce;* boiling water, *nine ounces.* Digest for one hour in a covered vessel, and strain. The product should measure about eight ounces."

This is a powerful astringent, and is employed in chronic diarrhœa. The dose is from f ℥ ss. to f ℥ ij.

INFUSUM LINI COMPOSITUM, Lond. *Compound Infusion of Linseed.* INFUSUM LINI, Edin. *Infusion of Linseed.*

"Take of linseed, bruised, *six drachms;* liquorice root, sliced, *two drachms;* boiling distilled water, *a pint.* Macerate for four hours near the fire, in a lightly-covered vessel, and strain (through linen or calico, Edin.)."

Syn. Infusion de Semence de Lin (*F.*), Leinsamen aufguss (*G.*), Infuso di Semi di Lino (*I.*).

This infusion is a solution of mucilage nearly in its pure state; clear, colourless, inodorous, and nearly insipid. Alcohol precipitates the mucilage in white flocculi; and precipitates are also produced by acetate and diacetate of lead, and tincture of the sesquichloride of iron: hence these substances are incompatible with this infusion.

Medical properties and uses. — Infusion of linseed is a cheap and very useful demulcent, in the various cases in which this class of remedies is indicated, and during the internal exhibi-

tion of bichloride of mercury. The dose is f ℥ ij., frequently repeated.

INFUSUM LUPULI, Lond. *Infusion of Hops.*

"Take of hops, *six drachms;* boiling distilled water, *a pint.* Macerate for four hours in a vessel lightly covered, and strain."

This infusion is stomachic, and supposed to be anodyne. It forms a good vehicle for more powerful agents. The dose is f ℥ j. to f ℥ ij.

INFUSUM MATICO, Dub. *Infusion of Matico.*

"Take of matico leaves, cut small, *half an ounce;* boiling water, *half a pint.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

Dose, f ℥ j. to f ℥ iij., when matico is indicated. See *Artanthe Elongata,* Part II.

INFUSUM MENTHÆ VIRIDIS, Dub. *Infusion of Spearmint.*

"Take of spearmint, dried and cut small, *three drachms;* boiling water, *half a pint.* Infuse for fifteen minutes in a covered vessel, and strain. The product should measure about eight ounces."

Medical properties and uses. — A useful carminative, sometimes used to allay vomiting. Dose f ℥ j. to f ℥ iij.

INFUSUM PAREIRÆ, Edin. Dub. *Infusion of Pareira.*

"Take of pareira, *six drachms;* boiling water, *a pint.* Macerate for two hours in a covered vessel, and strain through linen or calico."

Dublin.

"Take of pareira root, bruised, and torn into shreds, *half an ounce;* boiling water, *nine ounces.* Digest for one hour in a covered vessel, and strain. The product should measure about eight ounces."

It is a useful form of the medicine in catarrhus vesicæ, and other affections of the urinary organs, especially in irritable bladder. The dose is f ℥ j. to f ℥ ij. It may be used as a vehicle for the extract. The decoction is preferable, and has been substituted for the infusion by the London College.

INFUSUM POLYGALÆ, Dub. *Infusion of Senega.*

"Take of polygala root, bruised, *half an ounce;* boiling water, *nine ounces.* Digest for one hour in a covered vessel, and strain. The product should measure about eight ounces."

See *Infusum Senegæ.*

INFUSUM QUASSIÆ, Lond. Edin. Dub. *Infusion of Quassia.*

"Take of quassia wood, chipped, *two scruples;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

Edinburgh.

"Take of quassia, in chips, *one drachm;* boiling water, *one pint.* Infuse for two hours in a covered vessel, and strain through linen or calico."

Dublin.

"Take of quassia wood, rasped, *one drachm;* boiling water, *eight ounces and a half.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

The active matter of quassia (*quassine*), taken up by water, appears to be a simple bitter. It is not altered by any of the substances usually employed as adjuncts to bitters; and by two only of the metallic salts; namely, nitrate of silver, which throws down soft, yellow flakes; and acetate of lead.

Medical properties and uses. — This infusion is a light tonic, efficacious in dyspepsia, and cases in which tonics are indicated. In hysteria it may be combined with purgatives and tincture of valerian; in atonic gout, with aromatics; and in dyspeptic affections, with chalybeates, salts of zinc, or mineral acids. The dose is from f ℥ j. to f ℥ iij., twice or thrice a day.

The Dublin is much stronger than the other two.

INFUSUM RHEI, Lond. Edin. Dub. *Infusion of Rhubarb.*

"Take of rhubarb, sliced, *three drachms;* boiling distilled water, *a pint.* Macerate for two hours in a lightly-covered vessel, and strain."

Edinburgh.

"Take of rhubarb, bruised into coarse powder, *one ounce;* spirit of cinnamon, *two fluid ounces;* boiling water, *eighteen fluid ounces.* Infuse the rhubarb for twelve hours in the water in a covered vessel; add the spirit; and strain through linen or calico."

Dublin.

"Take of rhubarb root, in thin slices, *two drachms;* boiling water, *nine ounces.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

Syn. Infusion de Rhubarbe (*F.*), Rhabarber aufguss (*G.*), Infuso de Rabarbaro (*I.*)

These infusions differ in point of strength; the Edinburgh is rendered more pleasant by the spirituous addition. Neither of them is quite clear; and both have a reddish-brown colour, which is

very much deepened by the addition of alkalies. The following substances either occasion precipitates in these infusions, or otherwise alter their properties, and are therefore incompatible in formulæ with them; namely, the strong acids, carbonate of potassa, lime-water, salts of iron and of zinc, nitrate of silver, bichloride of mercury, acetate and diacetate of lead, and tartar emetic; infusions of catechu, cinchona, and cusparia; solution of gelatin.

Medical properties and uses.—These infusions are good forms for exhibiting rhubarb, when it is intended to act on the bowels: but they are considerably less active than the powder.

The dose of the London and Dublin infusions may be from f ℥ j. to f ℥ iij., and of the Edinburgh half the quantity, united with neutral salts or aromatics, as circumstances may direct.

INFUSUM ROSÆ COMPOSITUM, Lond. *Compound Infusion of Roses.*

"Take of the dried Gallic rose, *three drachms;* diluted sulphuric acid, *a fluid drachm and a half;* boiling distilled water, *a pint;* sugar, *six drachms.* Pour the water on the rose-petals in a covered glass vessel, and mix in the acid. Macerate for two hours. Finally, strain the liquor, and add the sugar."

INFUSUM ROSÆ, Edin. *Infusion of Roses.*

"Take of Rosa gallica, dried, *three drachms;* diluted sulphuric acid, *one fluid drachm and a half;* pure sugar, *six drachms;* boiling water, *one pint.* Infuse the rose-petals in the water in a covered vessel of glass or porcelain, not glazed with lead, for one hour; then add the acid, strain through linen or calico, and dissolve the sugar in the liquor."

INFUSUM ROSÆ ACIDUM, Dub. *Acid Infusion of Roses.*

"Take of petals of the Gallic rose, dried, *two drachms;* dilute sulphuric acid, *one fluid drachm;* boiling water, *half a pint.* Infuse the petals for one hour in the water, in a covered vessel, strain, and add the acid. The product should measure about eight ounces."

Syn. Infusion de Roses (*F.*), Rosen aufguss (*G.*), Infuso di Rose (*I.*).

This infusion is clear, of a beautiful red colour, and has an acid, pleasant, austere taste.[1] The addition of the sugar prevents it from keeping so long as it might otherwise be kept. The incompatible substances are those which are decomposed by the sulphuric acid. The sulphates of iron strike a blue black, and sulphate of

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[1] Dr. Clarke, of Cambridge, supposed that he had detected iron in the petals of the rose.

zinc, although it does not immediately alter the infusion, yet slowly produces a dark-coloured precipitate after some hours. It may be conjoined with syrup of iodide of iron.

Medical properties and uses. — Infusion of roses is indebted for any astringency it possesses chiefly to a small portion of tannic acid which it contains. It is used in the colliquative sweats of phthisis; and as a gargle in cynanche tonsillaris; but it is chiefly employed as an elegant vehicle for more active remedies, particularly sulphate of magnesia, the nauseous taste of which it completely covers. The dose is from f ℥ ij. to f ℥ iv.

INFUSUM SENEGÆ, Edin. *Infusion of Senega.* Called INFUSUM POLYGALÆ (Dub.).

"Take of senega, *ten drachms*; boiling water, *one pint.* Infuse for four hours in a covered vessel, and strain."

A useful infusion in convalescence from pneumonia and bronchitis. The dose is f ℥ j. to f ℥ jss.

INFUSUM SENNÆ COMPOSITUM, Lond. Dub. *Compound Infusion of Senna.*

"Take of senna, *fifteen drachms*; ginger, sliced, *four scruples*; boiling distilled water, *a pint.* Macerate for an hour in a lightly-covered vessel, and strain."

Dublin.

"Take of senna leaves, *half an ounce*; ginger root, sliced, *half a drachm*; boiling water, *half a pint.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

INFUSUM SENNÆ, Edin. *Infusion of Senna.*

"Take of senna, *one ounce and a half*; ginger, bruised, *four scruples*; boiling water, *one pint.* Macerate for an hour in a lightly-covered vessel, and strain through linen or calico."

Syn. Infusion de Séné (*F.*), Senna aufguss (*G.*), Infuso di Senna (*I.*).

This infusion should be clear; have a deep red-brown colour, and a slightly bitter, mawkish taste, which is scarcely corrected by the aromatic. In warm weather it spoils in forty-eight hours; and by simple exposure to the air attracts oxygen, which causes a yellowish precipitate of oxidized extractive, which is not purgative, but gripes violently. On this account it should be preserved in a well-closed vessel, or made only when it was wanted. An infusion prepared with cold water is more active, and less apt to spoil than one prepared with boiling water. Dr. Paris (*Pharmacologia*) observes, that the nauseous taste of this infusion is completely covered

by the addition of *Bohea tea.* Decoction of guaiacum is said to increase its powers, and to render it milder. Camphor mixture augments its activity. It is precipitated by the strong acids, the alkaline carbonates, lime-water, solutions of nitrate of silver, bichloride of mercury, acetate and diacetate of lead, tartar emetic, and infusion of yellow cinchona bark, which are consequently incompatible in formulæ with these infusions.

Medical properties and uses. — This infusion contains all the purgative principles of the plant, whilst the aromatics correct its griping properties: but there is a waste of senna in the London formula. It would be better to pulverise the leaflets, and macerate the powder in water at 160°: all the active matter is dissolved, and little of the griping part of the leaflet. It is ordered generally combined with neutral salts and manna. The dose of the simple infusion may be from f ℥ ij. to f ℥ iv.; but with the addition of ʒ j. of the tartrate of potassa, or ʒ iij. of the sulphate of magnesia, which are the usual adjuncts, f ℥ ij. are sufficient.

INFUSUM SENNÆ COMPOSITUM, Edin. *Compound Infusion of Senna.*

"Take of senna, *one drachm;* tamarinds, *one ounce;* coriander, bruised, *one drachm;* Muscovado sugar, *half an ounce;* boiling water, *eight fluid ounces.* Infuse for four hours, with occasional stirring, in a covered earthen vessel, not glazed with lead, and then strain through linen or calico.

"The infusion may be likewise made with twice or thrice the prescribed quantity of senna."

This infusion is pleasanter than the simple infusions, the nauseous taste being well covered by the sugar and the acid of the tamarinds; in other respects it agrees both in properties and in the effects of the incompatible substances on them; to which, however, must be added all salts having potassa for their base.

INFUSUM SERPENTARIÆ, Lond. Edin. *Infusion of Serpentaria.*

"Take of serpentaria, *half an ounce;* boiling distilled water, *a pint.* Macerate for four hours in a lightly-covered vessel, and strain (through linen or calico, E.)."

This infusion is a stimulating, diaphoretic tonic. It is advantageously administered in low fevers. The dose is f ℥ ss. to f ℥ ij.

INFUSUM SIMARUBÆ, Edin. Dub. *Infusion of Simaruba.*

"Take of simaruba, bruised, *three drachms;* boiling water, *a pint.* Infuse for two hours, and strain through linen or calico."

Dublin.

"Take of simaruba root bark, bruised, *two drachms;* boiling water, *nine ounces.* Infuse for one hour in a covered vessel, and strain. The product should measure about eight ounces."

This infusion is inodorous; has a slightly bitter, astringent taste, is clear, and of a greenish straw-colour. The alkaline carbonates and lime-water render it milky; nitrate of silver, bichloride of mercury, acetate and diacetate of lead, infusions of galls, catechu, and yellow cinchona bark, precipitate it.

Medical properties and uses. — Simaruba infusion possesses the same properties as the bark, and is the best form of exhibiting the remedy, but it is not much used in this country. The dose is f ℥ j. to f ℥ ij., combined with tincture of opium, or an aromatic.

INFUSUM VALERIANÆ, Lond. Dub. *Infusion of Valerian.*

"Take of valerian, *half an ounce* (*two drachms,* D.); boiling distilled water, *a pint* (*nine ounces,* D.). Macerate for half an hour (an hour, D.) in a lightly-covered vessel, and strain."

Valerian infusion is clear, of a pale brown colour, with the odour of the valerian, and a bitterish pungent taste. Solutions of nitrate of silver, sulphate of iron, and infusion of yellow cinchona, afford precipitates with this infusion; and are therefore incompatible in formulæ with it.

Medical properties and uses. — This is a useful form of giving valerian in hysterical and nervous affections, in which the stomach will not always bear the powder. The dose may be from f ℥ jss. to f ℥ ij., twice or thrice a day.

PREPARATA EX IODINIO.

Preparations of Iodine.

IODINEI LIQUOR COMPOSITUS, Edin. *Compound Solution of Iodine.* See *Preparations of Potassa.*

IODINIUM PURUM, Dub. *Pure Iodine.*

"Take of iodine, of commerce any convenient quantity, introduce it into a deep porcelain capsule of a circular shape, and having covered this as accurately as possible with a glass matrass filled with cold water, apply to the capsule a water heat for the space of twenty minutes, and then withdrawing the heat, permit the capsule to cool. Should the sublimate attached to the bottom of the matrass include acicular crystals of a white colour and

pungent odour, let it be scraped off with a glass rod and rejected. The matrass being now returned to its previous position, a gentle and steady heat (that of a gas-lamp answers well) is to be applied, so as to sublime the entire of the iodine. Upon now lifting off the matrass, the purified product will be found attached to its bottom: when separated it should be immediately enclosed in a bottle furnished with an accurately ground stopper.

The object of this process is to deprive iodine of any impurities which it may contain. The white acicular crystals which are often found in the sublimed product in the first part of the process consist of *Iodide of Cyanogen*, which is sometimes found in commercial iodine to the extent of 1 per cent.

LINIMENTA.

Liniments.

These are compositions which have the consistence of oil or balsam; so as to allow them to be easily rubbed upon the skin. They are in general more active remedies than cerates or ointments; and act as local stimulants, relieving deep-seated inflammations and pains.

LINIMENTUM ÆRUGINIS, Lond. *Liniment of Verdigris.*

"Take of verdigris, powdered, *an ounce;* vinegar, *seven fluid ounces;* honey, *fourteen ounces.* Dissolve the verdigris in the vinegar, and strain it through linen; then, having added the honey, boil down to a proper consistence."

This preparation, which is the *Mel Egyptiacum* of the old Pharmacopœias, is improperly named a liniment by the London College. It is detergent and escharotic; and in the above state is used for taking down fungous flesh; and, considerably diluted, it is a useful stimulant to foul ulcers, which it clears and excites to a more healthy action. It has been employed as a gargle in venereal ulcerations of the mouth and fauces; but I cannot recommend it.

LINIMENTUM AMMONIÆ, Lond. Edin. Dub. *Liniment of Ammonia.*

"Take of solution of ammonia, *a fluid ounce;* olive oil, *two fluid ounces.* Shake them together until mixed.

Edinburgh.

"Take of olive oil, *two fluid ounces;* aqua ammoniæ, *one fluid ounce.* Mix, and agitate them well together."

Dublin.

"Take of solution of ammonia, *one fluid ounce;* olive oil, *three fluid ounces.* Mix them, with agitation."

Syn. Liniment volatil (*F.*), Ammonium liniment (*G.*), Linimento volatile (*I.*).

In these preparations a chemical union takes place between the alkali and the fixed oil, and produces a white soap, which is kept fluid by the water of the solution of ammonia. It is an excellent rubefacient, and is efficaciously employed in cynanche tonsillaris, spread on a piece of flannel, and applied round the throat; and to relieve rheumatic pains it is rubbed upon the skin over the affected part, often with the addition of a little camphor, or, what is preferable, some extract of belladonna. I have found a medium proportion of solution of ammonia, or half a fluid ounce to two fluid ounces of oil, form a preparation better fitted for general use than the above.

LINIMENTUM AMMONIÆ COMPOSITUM, Edin. *Compound Liniment of Ammonia.*

"Take of stronger aqua ammoniæ (D. 880), *five fluid ounces;* tincture of camphor, *two fluid ounces;* spirit of rosemary, *one fluid ounce.* Mix them well together. This liniment may be also made weaker for some purposes with three fluid ounces of tincture of camphor, and two of spirit of rosemary."

Use as the last. Odour more agreeable.

LINIMENTUM AMMONIÆ SESQUICARBONATIS[1], Lond. *Liniment of Sesquicarbonate of Ammonia.*

"Take of solution of sesquicarbonate of ammonia, *a fluid ounce;* olive oil, *three fluid ounces.* Shake them together until they unite."

In this preparation the combination of the oil and alkali is less perfect owing to the carbonic acid of the sesquicarbonate. It is also much less soluble in water, and after a little time the soapy matter separates from the water. It is intended for the same purposes as the strong liniment, which can be reduced by the addition of oil; therefore, this may be regarded as a superfluous preparation.

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[1] Linimentum volatile, P. L. 1745. Linimentum ammoniæ, P. L. 1787.

LINIMENTUM CALCIS, Lond. Edin. Dub. *Liniment of Lime-water.*

"Take of lime-water, olive oil, each, *ten fluid ounces.* Shake them together until they are mixed."

Edinburgh.

"Take of linseed oil, lime-water, of each, *equal measures.* Mix and agitate them well together."

Dublin.

"Take of lime-water, olive oil, of each, *two fluid ounces.* Mix and agitate them well together."

These are solutions of earthy soaps, formed by the chemical union of the lime and the oil. They are thick, of a white colour, devoid of acrimony; and are very advantageously applied to burns and scalds. The soapy matter separates from the water, when the liniment is kept for a little time; it is always better, therefore, to prepare it only when it is wanted.

LINIMENTUM CAMPHORÆ, Lond. Edin. Dub. *Liniment of Camphor.*

"Take of camphor, *one ounce;* olive oil, *four fluid ounces.* Dissolve."

The Edinburgh formula is the same.

Dublin.

"Take of camphor, in thin slices, *one ounce;* olive oil, *four fluid ounces.* Dissolve the camphor in the oil with a gentle heat."

These solutions of camphor in fixed oil are useful embrocations to glandular swellings, sprains, bruises, and to joints affected with rheumatic pains. Mr. Ware recommends them, with the addition of half an ounce of the solution of sesquicarbonate of potassa, to be applied to the eyelids night and morning in incipient amaurosis.

LINIMENTUM CAMPHORÆ COMPOSITUM, Lond. Dub. *Compound Liniment of Camphor.*

"Take of camphor, *two ounces and a half;* oil of lavender, *a fluid drachm;* rectified spirit, *seventeen fluid ounces;* stronger solution of ammonia, *three fluid ounces.* Dissolve the camphor and oil in the spirit, then add the ammonia, and shake them well together until they are mixed."

Dublin.

"Take of camphor, *five ounces;* oil of lavender, *two fluid drachms;* rectified spirit, *one pint and a half;* stronger solution

of ammonia, *half a pint.* Dissolve the camphor and oil of lavender in the spirit, then add the solution of ammonia, and mix with agitation."

This is a very useful stimulant application to sprains, bruises, and rheumatic pains. It is also an excellent vehicle for introducing opium into the habit by means of friction. An embrocation composed of f ℥ jss. of this liniment, and f ℥ ss. of tincture of opium, warmed, and rubbed over the surface of the abdomen, quickly allays the pains of flatulent colic.

LINIMENTUM CANTHARIDIS, Dub. *Liniment of Cantharidis.*

"Take of Spanish flies, in fine powder, *three ounces;* olive oil, *twelve fluid ounces.* Digest the flies in the oil for three hours, in a steam or water-bath, and strain through flannel; express the residuum and strain the oil thus obtained: finally, mix both products."

A stimulant application, but not much used.

LINIMENTUM CROTONIS, Dub. *Liniment of Croton Oil.*

"Take of croton oil, *one fluid ounce;* oil of turpentine, *seven fluid ounces.* Mix them with agitation."

This embrocation is a useful form, when it is required to induce very powerful counter-irritation, and the eruption of small pustules. Olive oil is more commonly used in place of the turpentine, and has the advantage of freedom from odour. Care should be taken to prevent the eyes or any part of the face from being touched with these liniments, as they may induce violent inflammation: the vapour of the Pharmacopœia liniment is acrid.

LINIMENTUM HYDRARGYRI, Lond. *Liniment of Mercury.*

"Take of the stronger mercurial ointment, lard, of each, *four ounces;* camphor, *an ounce;* rectified spirit, *a fluid drachm;* solution of ammonia, *four fluid ounces.* First rub the camphor with the spirit, then with the lard and mercurial ointment; lastly, drop in gradually the solution of ammonia, and mix the whole."

LINIMENTUM HYDRARGYRI COMPOSITUM, Dub. *Compound Mercurial Liniment.*

"Take of ointment of mercury, *one ounce;* camphor liniment, solution of ammonia, of each, *one fluid ounce.* Melt the ointment in the liniment with a gentle heat, then add the ammonia, and mix them with agitation."

These liniments are stimulant and discutient. They are em-

ployed as embrocations to parts affected with chronic venereal pains, nodes, and tophi; to indolent swellings, and to discuss morbid collections of fluid. One drachm should be rubbed on the affected part night and morning. When largely used they salivate sooner than mercurial ointment.

LINIMENTUM OPII, Lond. Edin. Dub. *Liniment of Opium.*

"Take of liniment of soap, *six fluid ounces;* tincture of opium, *two fluid ounces.* Mix."

Edinburgh.

"Take of Castile soap, *six ounces;* opium, *an ounce and a half;* camphor, *three ounces;* oil of rosemary, *six fluid drachms;* rectified spirit, *two pints.* Macerate the soap and opium in the spirit for three days; filter; add the oil and camphor, and agitate briskly."

Dublin.

"Take of tincture of opium, soap liniment, of each, *one fluid ounce.* Mix them with agitation."

A useful liniment in local pains, and to procure sleep when opiates taken into the stomach disagree.

LINIMENTUM SAPONIS[1], Lond. Edin. Dub. *Soap Liniment.*

"Take of soap, *two ounces and a half;* camphor, *ten drachms;* spirit of rosemary, *eighteen fluid ounces;* distilled water, *two fluid ounces.* Mix the water with the spirit, then add the soap and camphor, frequently shaking them until they are liquified. Dissolve the camphor in the spirit; then add the soap, and macerate in the heat of a sand-bath, until they be dissolved."

Edinburgh.

"Take of Castile soap, *five ounces;* camphor, *two ounces and a half;* volatile oil of rosemary, *six fluid drachms;* rectified spirit, *two pints.* Digest the soap in the spirit for three days, add the camphor and the oil, and agitate briskly."

Dublin.

"Take of Castile soap, reduced to powder, *two ounces;* camphor, *one ounce;* proof spirit, *sixteen fluid ounces.* Dissolve the soap in the spirit, with a gentle heat, then add the camphor, and when it is

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[1] Linimentum saponaceum, P. L. 1745. Lin. Saponis compositum, P. L. 1824.

dissolved, filter through paper; or, allow it to stand for some time, and decant the clear liniment."

Syn. Kampferliniment (*G.*).

These preparations are stimulant and anodyne, and may be advantageously applied against local pains, and in bruises, rubbed upon the parts.

LINIMENTUM SIMPLEX, Edin. *Simple Liniment.*

"Take of olive oil, *four parts;* white wax, *one part.* Dissolve the wax in the oil with a gentle heat; and agitate well as the fused mass cools and concretes."

Used to aid friction on any part.

LINIMENTUM TEREBINTHINÆ, Lond. Dub. *Turpentine Liniment.*

"Take of soft soap, *two ounces;* camphor, *an ounce;* oil of turpentine, *sixteen fluid ounces.* Shake them until they are mixed."

Dublin.

"Take of oil of turpentine, *five fluid ounces;* ointment of resin, *eight ounces.* Melt the ointment, then add the oil of turpentine gradually, and stir the mixture until a uniform liniment is obtained."

LINIMENTUM TEREBINTHINATUM, Edin. *Terebinthinate Liniment.*

"Take of resinous ointment, *four ounces;* oil of turpentine, *five fluid ounces;* camphor, *half an ounce.* Mix the ointment, and gradually mix with it the camphor and oil, till a uniform liniment be obtained."

These liniments were introduced into practice by Dr. Kentish, at that time a surgeon in Newcastle, as a dressing to burns immediately after they happen, and until the loosening of the eschars. Dr. Kentish's plan was first to bathe the parts with warm oil of turpentine, and then to apply over them plasters, thickly spread, of this liniment; at the same time that he supported the strength with wine, opium, and cordials. After the life of the parts appeared to be restored, purges were given, the cordials omitted, and mild emollient dressings applied. I have had several opportunities of witnessing the good effects of this plan of treatment.[1]

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[1] *Essays on Burns, &c.*, by Edward Kentish, 1797 and 1800.

MELLITA.

PREPARATIONS OF HONEY.

A MORE correct knowledge of the operation of those medicinal substances which have been named *balsamic* or *pectoral*, has set aside the high opinion which formerly prevailed of the efficacy of honey as a remedy in pulmonary diseases. It is, however, still employed in pharmacy, and has some advantages over syrup, particularly where it is to be employed as a local application; but, for internal purposes, its use is to a certain degree limited, owing to the unpleasant effects which it produces on the bowels of some individuals. They are not apt to spoil, and, therefore, require less care to preserve them than the syrups.

MEL DEPURATUM, Dub. *Clarified Honey.*

"Take of fine honey, *any quantity*. Melt it in a water-bath; and strain it while hot through flannel."

Syn. Miel despumé (*F.*), Geschäumter Honig (*G.*), Mele Schiumato (*I.*).

By thus liquefying honey, the wax, which it may have retained when expressed from the comb, rises to the surface; and at the same time any sand or other impurities, with which it may have been fraudulently mixed, fall to the bottom or rise with the wax, and are easily separated. The specific gravity of purified honey is 1·31. It is chiefly employed for forming the other preparations into which honey enters. It is less apt to gripe than the crude honey, owing, probably, to its being less liable to ferment. It is, undoubtedly, more agreeable to the taste and smell than crude honey, and is used in making the officinal preparations.

MEL BORACIS, Lond. Edin. Dub. *Honey of Borax.*

"Take of borax, powdered, *a drachm*; honey, *an ounce*. Mix them."

The proportions are the same in the three Pharmacopœias, but in the Dublin, clarified honey is ordered to be used by weight (avoird.).

The borax undergoes a change, as well as the honey, and a preparation results which is not a simple solution of borax in honey. This change is not yet satisfactorily explained.

This is a cooling, detergent, useful application to the tongue and fauces in aphthous affections. Dissolved in water, it forms an excellent gargle for allaying the pain attending mercurial salivations.

MEL ROSÆ, Lond. Edin. *Rose Honey.*[1]

"Take of dried red rose, *four ounces;* boiling distilled water, *twenty-four ounces;* honey, *five pounds.* Macerate the rose petals, first separated, in sixteen fluid ounces of water for two hours, then lightly press with the hand, and strain. What remains, macerate again for a little time in the rest of the water, and pour off the liquor. To this add the half of the first infusion, and set aside the other half. Then to the honey add the mixed liquors, and evaporate in a water bath, so that the solution which was set aside, being added, it may become a proper consistence."

Edinburgh.

"Take of the dried petals of rosa gallica, *four ounces;* boiling water, *two pints and a half;* honey, *five pounds.* Infuse the petals in the water for six hours; strain and squeeze; let the impurities subside; pour off the clear liquor; mix the honey with it; and evaporate the whole in the vapour-bath to the consistence of syrup, removing the scum which forms."

Syn. Miel rosat (*F.*), Rosenhonig (*G.*), Mele rosato (*I.*).

This honey has the pleasant flavour of the rose, and a slight degree of astringency. In making it, the clarified honey is to be preferred. It is chiefly employed as an adjunct to detergent and astringent gargles.

OXYMEL[2], Lond. Dub. *Oxymel.*

"Take of acetic acid, *seven fluid ounces;* distilled water, *eight fluid ounces;* honey, *five pounds.* Mix the acid added to the water with the honey made hot."

Dublin.

"Take of clarified honey, by weight, *one pound;* acetic acid of commerce (sp. gr. 1044) *three ounces.* Mix the acid with the honey previously heated."

Syn. Oxymel (*F.*)., Essighonig (*G.*), Ossimele (*I.*).

Simple oxymel in doses of f℥j. or more, dissolved in barley-water, forms a pleasant and cooling beverage in fevers and inflammatory affections; but in some individuals it has a griping quality like honey, which prevents it from being generally used in these affections. It is often added to gargles in cynanche tonsillaris, and is a common vehicle of other remedies in catarrhal complaints. The Dublin oxymel is very much stronger than the London.

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[1] Mel rosarum, P. L. 1720. Mel rosaceum, P. L. 1745.
[2] Mel acetatum, P. L. 1787.

OXYMEL SCILLÆ[1], Lond. *Oxymel of Squill.*

"Take of vinegar of squills, *two pints and a half;* honey, *five pounds.* Evaporate the vinegar over a slow fire down to twelve fluid ounces, and mix with the honey made hot."

Syn. Meerzwiehelhonig (*G.*).

Oxymel of quill is principally employed as an expectorant, and as such is very useful in humoral asthma, and chronic coughs, in doses from f ʒ ss. to f ʒ ij. It is generally given in some aromatic distilled water, to prevent the nausea which it is apt to induce: in larger doses it is given in hooping-cough, to excite vomiting, and at the same time clear the chest.

When kept for a considerable time, this oxymel lets fall a precipitate which has the aspect of crystallized honey. Vogel found it to consist of citrate of lime, tannic acid, and honey.[2]

METALLICA.

METALLIC PREPARATIONS.

PREPARATA EX ALUMINIO.

PREPARATIONS OF ALUMINIUM.

ALUMEN EXSICCATUM, Lond. Edin. *Dried Alum.*

"Take of alum *a pound.* Melt the alum over the fire, and increase the heat until the ebullition cease."

Edinburgh.

"Melt *any convenient quantity* of alum; fuse it over the fire in a vessel of iron or earthenware, continue the heat till ebullition ceases and vapour is no longer discharged, and then reduce it to powder."

ALUMEN SICCATUM, Dub. *Burnt Alum.*

"Take of alum *any convenient quantity;* liquefy it in a porcelain capsule over a gas lamp or open fire, and continue the heat until vapour ceases to be disengaged. Let the residue be reduced to a fine powder, and preserved in a well stopped bottle."

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[1] Oxymel scilliticum, P. L. 1720, 1745.

[2] *Annales de Chimie*, vol. lxxxiii. p. 157.

Syn. Sulphate d'Alumine Sec (*F.*), Gebrannter Alaun (*G.*), Alume calcinato (*I.*).

In these processes the alum, which is a sulphate of alumina and of potassa, loses its water of crystallization: but if the heat be too great, its acid is partly expelled, and it is partially decomposed. According to Kirwan, alum desiccated at 700° loses more than half its acid. By our experiments, English alum lost 0·43 in a moderate heat, and 0·46 in a red: Lavant alum 0·41 in a moderate heat, and 0·44 in a red heat. Chaptal found that in a red heat alum of his own manufacture lost 0·67; Roman alum, 0·50; English, 0·47; and Levant alum, 0·40.

Qualities. — Dried alum has a more astringent taste than the crystallized salt; and it is less soluble. It is obtained in the form of a light, opaque, white, spongy, friable mass, 100 parts of which consist of 36·25 acid, and 63·75 base, when it has been exposed to a heat of 700°: but in general, the desiccation being conducted at a lower temperature, the proportion of acid is greater.

Medical properties and uses. — It is chiefly used as an escharotic to destroy fungus in ulcers; but has also been given internally to the extent of ℈ j. for a dose in cases of colic, the pain of which it is said to allay, while at the same time it gently opens the bowels.

LIQUOR ALUMINIS COMPOSITUS, Lond. *Compound Solution of Alum.*

"Take of alum, sulphate of zinc, of each, *an ounce;* distilled water, *three pints.* Rub the alum and sulphate together, dissolve in water, and then filter."

This powerful astringent solution has been successfully used in gleets and leucorrhœa; and in some cases of ophthalmia. It requires to be diluted in all these cases, and to be employed with caution. Half an ounce of the solution and six and a half ounces of rose-water form an excellent collyrium in ophthalmia, after local bleeding.

PREPARATA EX ANTIMONIO.

PREPARATIONS OF ANTIMONY.

ANTIMONII SULPHURETUM PRÆPARATUM, Dub. *Prepared Sulphuret of Antimony.*

"Take of sulphuret of antimony, of commerce, *any convenient quantity;* let this be reduced to powder, and the finer particles

having been separated from the coarser by the method explained in the formula for creta preparata, let them be dried, and preserved for use."

Syn. Sulphure d'Antimoine (*F.*), Schwaser Schwefelspeiss-glanz (*G.*), Solfuro d'antimonio depurato (*I.*), Kohul (*Arab.*), Surmah (*Hind.*).

This mechanical preparation is intended to fit the sulphuret for internal use.

Qualities. — Prepared sulphuret of antimony is an inodorous, insipid, blackish, or deep leaden-grey, dull powder, which stains the fingers, and is insoluble in water.

According to the analysis of Dr. Thomas Thomson, sulphuret of antimony is a compound of 100 parts of antimony and 35·572 of sulphur; it is a tersulphuret, and consists of 1 equivalent of antimony + 3 equivalents of sulphur.

Medical properties and uses. — Sulphuret of antimony is inert, unless it meet with acid in the stomach, in which case it usually operates either as a diaphoretic or a mild cathartic, but occasionally it produces excessive vomiting and purging; hence it is proper to evacuate the stomach and bowels previous to its use. It has been found efficacious in scrofula, gout, chronic rheumatism, and herpetic eruptions; but its beneficial effects are very slowly produced, and consequently the use of the remedy, in order that it may prove serviceable, must be continued for a considerable length of time. The dose is from grs. v. to ℈ j. mixed with any convenient vehicle.

ANTIMONII[1] OXYSULPHURETUM, Lond. *Oxysulphuret of Antimony.*

"Take of tersulphuret of antimony, in powder, *seven ounces;* solution of soda, *four pints;* distilled water, *two gallons;* diluted sulphuric acid, *as much as may be required.* Mix the tersulphuret and soda with the water, and boil with a gentle fire for two hours, assiduously stirring, and occasionally adding distilled water, so that the same measure may be kept up. Strain the solution, and drop into it gradually as much diluted sulphuric acid as may be necessary for precipitating the oxysulphuret of antimony: then wash away the sulphate of soda with water, and dry what remains with a gentle heat."

SULPHURETUM ANTIMONII AUREUM. Edin.

"Take of sulphuret of antimony, in fine powder, *one ounce;* solution of potash, *eleven fluid ounces;* water, *two pints.* Mix the water and solution of potash, add the sulphuret, boil for an hour, filter immediately, and precipitate the liquid, while hot, with an

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[1] Formerly, *Sulphur antimonii præcipitatum. Sulphur auratum Antimonii. Antimonii Sulphuretum præcipitatum.*

excess of diluted sulphuric acid. Collect the precipitate on a calico filter, wash it thoroughly with water, and dry it with a gentle heat."

ANTMONII SULPHURETUM PRECIPITATUM, Dub. *Precipitated Sulphuret of Antimony.*

" Take of prepared sulphuret of antimony, *five ounces;* carbonate of potash from pearl-ash, first dried by a low red heat, and reduced to powder, *four ounces;* water, *one gallon;* pure sulphuric acid, *two fluid ounces;* distilled water, *one quart.* Mix the sulphuret of antimony and carbonate of potash in a mortar, and heat the mixture in a Hessian crucible, first cautiously, until effervescence ceases, and then to low redness, so as to produce liquefaction. Pour out the melted mass on a clean flag, and when it has concreted and cooled, rub it to a fine powder in a porcelain mortar. Add this, in successive portions, to *ten gallons* of water, while boiling in an iron vessel, and, having maintained the ebullition for twenty minutes, transfer the whole to a calico filter, and cause the solution which passes through to drop into the distilled water, previously mixed with the sulphuric acid. Let the precipitate which forms be collected on a calico filter, and let warm distilled water be repeatedly poured upon it, until the liquid which passes through ceases to give a precipitate, when dropped into a solution of nitrate of barytes. Finally, dry the product on porous bricks, placed in a warm atmosphere."

Syn. Soufre doré d'antimoine (*F.*), Gelber Spiessglanzschwefel (*G.*), Zolfo dorato di antimonio (*I.*).

Although these formulæ differ from each other, the products of all of them are the same, — namely, an oxysulphuret of antimony. The following is the theory of its formation: — During the boiling, the soda or potassa and the tersulphuret of antimony are each partially decomposed, and form sulphuret of sodium or potassium, and teroxide of antimony, mixed with much of the tersulphuret dissolved in the potassa or soda, and two salts appear to be formed, one an oxygen salt, with the teroxide of antimony as the acid, and the alkali as base; the other a sulphur salt, with the tersulphuret as the acid, and the sulphuret of the alkaline metal for the base. The diluted sulphuric acid, which is added to the strained solution whilst it is hot, combines with the potassa or soda, changing it into the sulphate, and disengaging sulphuretted hydrogen gas, whilst the oxide and the sulphuret of antimony are precipitated together, forming the oxysulphuret.

Qualities. — The oxysulphuret of antimony is an orange-coloured powder, slightly styptic to the taste, inodorous, and insoluble in water; but it is soluble in liquor potassæ, forming a colourless solution. It readily catches fire, and burns with a blue and greenish

flame, exhaling the odour of sulphurous acid, and leaving the metal after the combustion in the form of a greyish-white oxide. When heated with strong hydrochloric acid, sulphuretted hydrogen is evolved. It is said to be frequently sophisticated. When pure it does not effervesce with acids, a fact which enables its adulteration with chalk to be readily discovered.

Mr. Phillips regards it as a compound of 12 parts of ter-oxide of antimony + 76·5 of the ter-sulphuret + 11·5 of water in 100 parts. But its composition appears to vary. The Edinburgh college regards it as a mixture of ter-oxide, and ter-sulphuret of antimony and sulphur.

Medical properties and uses. — This preparation of antimony is diaphoretic, expectorant, and emetic, according to the dose. It was formerly much employed in asthma, and in catarrhal affections; but as its activity depends on the quantity of sesquioxide of antimony it contains, it is uncertain in its operation, and is not much employed in modern practice, unless when combined with mercurials, when it forms a useful alterative in herpetic and other eruptions. It is also occasionally prescribed in conjunction with opium, or other narcotics, and sarsaparilla, in cases of chronic rheumatism. During its use, the patient must avoid taking acids and acidulous salts, as these augment greatly the emetic properties of the preparation. The dose is from gr. j. to grs. iv., in a pill, twice a day.

Officinal preparation. — *Pilulæ Hydrargyri Chloridi comp.*, L.

ANTIMONII TERCHLORIDI LIQUOR, Dub. *Solution of Terchloride of Antimony.*

"Take of prepared sulphuret of antimony, *one pound;* muriatic acid of commerce, *four pints.* Upon the sulphuret, placed in a porcelain capsule, pour the acid, and, constantly stirring, apply to the mixture, beneath a flue with a good draught, a gentle heat, which must be gradually augmented as the development of the gas begins to slacken, and finally carried to ebullition, and maintained at this temperature for fifteen minutes. The vessel being now removed from the fire, let its liquid contents be separated by filtration through calico, returning what passes through first in order, that a perfectly clear solution may be obtained. Transfer the liquid to another capsule, and, having boiled it down to the bulk of one quart, allow it to cool, and preserve it in a bottle furnished with a well-ground glass stopper. The specific gravity of this solution is 1470.

Uses. — This solution is employed as a very powerful caustic to wounds of rabid animals, also to prepare the oxide of antimony.

ANTIMONII OXYDUM, Edin. Dub. *Oxide of Antimony.*

"Take of sulphuret of antimony, in fine powder, *four ounces;*

muriatic acid (commercial), *one pint;* water, *five pints.* Dissolve the sulphuret in the acid with the aid of a gentle heat; boil for half an hour; filter; pour the fluid upon the water; collect the precipitate on a calico filter; wash it well with cold water, then with a weak solution of carbonate of soda, and again with cold water, till the water ceases to affect reddened litmus paper. Dry the powder over the vapour-bath."

Dublin.

"Take of solution of terchloride of antimony, *sixteen fluid ounces;* water, *two gallons;* solution of caustic potash, *one pint;* distilled water, *a sufficient quantity.* Pour the antimonial solution into the water, and, having stirred the mixture well, set it by until the white precipitate which forms has subsided. Draw off the supernatant liquid by decantation or the syphon, and, having agitated the sediment with a gallon of distilled water, allow the whole to stand till the oxide has fallen to the bottom. Decant again, and having placed the sediment on a calico filter, wash it with distilled water until the liquid which trickles through reddens blue litmus paper only in a very slight degree. The precipitate is now shaken occasionally for an hour, with the solution of caustic potash, and then washed on a filter with boiling distilled water, until the washings cease to give a precipitate on being dropped into an acid solution of nitrate of silver. Lastly, let the product be dried at a heat not exceeding 120°."

This oxide is in the form of a white powder, which melts, and is dissipated as a white vapour when it is urged by flame before the blow-pipe: but if the vapour be collected, it forms acicular crystals. It is tasteless, inodorous, permanent in the air, and insoluble in water. When boiled with bitartrate of potassa, it forms tartar emetic: it also dissolves in and combines with acetic acid; and forms a chloride of antimony when treated with hydrochloric acid. It is a compound of 1 eq. of antimony + 3 of oxygen. Formula, $Sb\,O_3$.

Medical properties and uses.—This oxide varies in its action, being emetic and purgative in large doses; diaphoretic in small doses. It may be advantageously substituted for James's Powder, which probably owes its activity to this oxide. Its dose is grs. iij. to grs. x.

ANTIMONII POTASSIO-TARTRAS, Lond. *Potassio-tartrate of Antimony.*

"Take of tersulphuret of antimony reduced to the finest powder, *a pound;* sulphuric acid, *fifteen fluid ounces;* bitartrate of potash, *ten ounces;* distilled water, *five pints.* Mix the tersulphuret with the acid in an iron vessel. Apply to these a slow fire under a

chimney, frequently stirring with a spatula. Then increase the fire, until the flame of the ignited sulphur being extinct, nothing but a whitish powdery mass remains. Wash this with water when it has cooled, until nothing acid can be detected; and dry. Accurately mix nine ounces of this salt with the bitartrate, and boil in water for half an hour. Filter the solution whilst hot, and set aside, that crystals may form; dry them, the fluid being poured from them, and then evaporate this liquid, that crystals may form.

ANTIMONIUM TARTARIZATUM, Edin. Dub. *Tartrate of Antimony.*

"Take of sulphuret of antimony, in fine powder, *four ounces;* muriatic acid (commercial), *one pint:* water, *five pints.* Dissolve the sulphuret in the acid with the aid of a gentle heat; boil for half an hour; filter; pour the liquid into the water; collect the precipitate on a calico filter, wash it with cold water till the water ceases to redden litmus paper; dry the precipitate over the vapour-bath.

Take of this precipitate, *three ounces;* bitartrate of potassa, *four ounces and two drachms;* water, *twenty-seven fluid ounces.* Mix the powders, add the water, boil for an hour; filter; set the liquid aside to crystallize. The mother liquor, when concentrated, yields more crystals, but not so free of colour, and therefore requiring a second crystallization."

Dublin.

"Take of oxide of antimony, *five ounces;* white bitartrate of potash, *six ounces;* distilled water, *one quart.* Rub the bitartrate to a fine powder, and having carefully mixed with it the oxide of antimony, add a little water, so as to convert the mixture into a thick paste, which should be set by for twenty-four hours. Pour on this the remainder of the water, previously raised to the temperature of 212°, and having boiled for fifteen minutes, with repeated stirring, in a glass or porcelain vessel, filter through calico, returning the slightly turbid liquid which first passes through, so as to obtain a clear solution. After twelve hours, let the solution be decanted from the crystals which will have formed, and boiled down to one-third, when, upon cooling, an additional product will be obtained. The salt, after being dried upon blotting paper without the application of heat, should be preserved in a bottle."

Syn. Tartrate de Potasse antimonié (*F.*), Spiessglanz-weinstein (*G.*), Tartaro antimoniato (*I.*).

The explanation of the London process is as follows: — when tersulphuret of antimony is gently heated with sulphuric acid, a teroxide of the metal is formed, and sulphur and sulphurous acid set

free; the heat being increased, the sulphur and sulphurous acid are driven off, and the teroxide of antimony remains in combination with some of the undecomposed sulphuric acid, in the form (according to Mr. Phillips and Mr. J. Denham Smith) of a tersulphate ($Sb\,O_3$, $3\,SO_3$), which, on being washed with cold water, is resolved into a small portion of a soluble supersulphate, and an insoluble subsulphate; which latter, by the continued action of the water, becomes at last a disulphate ($2\,Sb\,O_3$, $S\,O_3$). By boiling this salt with bitartrate of potassa, the teroxide of antimony contained in it replaces the basic equivalent of water of the tartrate, and the resulting compound is the potassio-tartrate of antimony. In the Edinburgh process, the teroxide is formed by dissolving the tersulphuret of antimony in hydrochloric acid, and then pouring the resulting solution of terchloride of antimony into water, by which it is decomposed, and the insoluble teroxide precipitated; which is afterwards boiled with the bitartrate of potassa, as in the London process. The Dublin process consists merely in uniting the oxide of antimony, prepared by a method separately given, with the bitartrate of potassa.

Qualities. — Tartrate of antimony and potassa is procured in transparent crystals, the general character of which is an octahedron with a rhombic base. It is inodorous, and very slightly styptic to the taste. The salt should be bought in crystals. In powder, it is frequently adulterated with bitartrate of potassa. If a few of the crystals be put into a solution of *sulphuretted hydrogen*, their goodness may be judged of by the quantity of orange-coloured precipitate that forms. When the salt is adulterated with bitartrate of potassa, it is precipitated from its solution in water by spirit. If iron be present, by adding to the solution acetic acid, and then ferrocyanide of potassium, a blue precipitate is obtained. Tartar emetic effloresces, becoming white and opaque, when exposed to the air: if the crystals deliquesce, its purity may be suspected. It is soluble in about 15 parts of water at 60°, forming a perfectly clear, transparent solution; and in 3 parts at 212°, in which crystals form as it cools. It is insoluble in alcohol. It is spontaneously decomposed when kept in aqueous solution, and is also decomposed by heat, the strong acids, the alkalies and alkaline carbonates, the earths, hydrosulphurets, some of the metallic oxides, lime-water, chloride of calcium, and acetates of lead; and also by the decoctions or infusions of many bitter and astringent vegetables, as those of cinchona bark, rhubarb, galls, kino, and catechu; with which, therefore, it ought never to be conjoined in prescriptions. It is not precipitated by chloride of barium, or nitrate of silver; from 100 grains, dissolved in water, 49 grains are thrown down by hydrosulphuric acid. The composition of this salt, when crystallized, is represented by the formula, $KO,\ Sb\,O_3 + C_8\,H_4\,O_{10} + 3\,HO$.

Medical properties and uses. — This triple salt is emetic, diaphoretic, expectorant, alternative, rubefacient, and sometimes cathartic. It is certainly the most important of the antimonial preparations; and in proper doses may supersede the use of all the others. It is given as an emetic in the commencement of fevers, in doses of from one to two grains dissolved in distilled water. To obtain its diaphoretic effect, the general dose is from one-sixteenth to one-fourth of a grain. But the practice of giving it in large doses suggested by Dr. Marryatt of Bristol, in 1790, is now much followed. Laennec in France, M. Rasori in Italy, and some English physicians besides myself, prescribe it in large doses, in acute rheumatism, inflammation of the lungs, and the pleura, in chorea, hydrocephalus, and apoplexy. Laennec orders from grs. iv. to grs. vj. in a glass of infusion of orange-leaves, sweetened, and gradually increases the dose. Rasori gives at first to the amount of grs. xij. during the day, and the same quantity at night, dissolved in a pint of barley-water, to be taken in divided doses; and carries it to doses of two grains and a half every two hours.[1] I have given it in doses of grs. ij. and iij. in pleurisy, after one blood-letting. The two first doses cause vomiting; but this seldom occurs after the second dose; and full doses may be continued for weeks without any nausea being excited. It should never be ordered when the redness of the tongue indicates an irritable condition of the mucous membrane. It causes sometimes copious purging; depresses strength; quickens the pulse; and excites profuse nocturnal sweating. It seems in thus acting to accelerate absorption; and has been given with advantage in articular dropsy.[2] In small doses, combined with squill, ammoniacum, and camphor, repeated every three hours, it operates as an expectorant. It has been given, by a German physician of the name of Dreyer, in combination with hydrochlorate of ammonia, to reduce the cough in croup after the inflammatory symptoms have been subdued.[3] In doses of gr. j. also combined with calomel, it is a powerful alterative in acute rheumatism, and many cutaneous diseases. When ʒ ij. of it are triturated with ℥ j. of lard, and applied to the skin, it causes a pustular eruption, which has proved very serviceable in mania, white swellings, and deep-seated inflammations, as a counter-irritant. Dr. Joseph Tonelli supposes, that, independent of the local irritation on the skin, which this ointment produces, it exerts a specific effect on the lungs; owing, as he conjectures, to its abstracting a portion of the oxygen which the lungs furnish to the blood.[4] This opinion is purely hypothetical. The effects of

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[1] *Arch. Gen. de Med.* May, 1824.
[2] *Prov. Med. Journ.*, Dec., 1842.
[3] *Neue Zeitschr. f. Geburtskunde*, 13. Band, 1. Heft.
[4] *Annali Univ. di Medic.*, July, 1824.

this ointment on the lungs, labouring under disease, however, is very wonderful, as I have had many opportunities of proving. On some skins it does not always produce the desired effect, and requires to be aided by the addition of white sugar, as in the following formula: ℞. Antimonii Potassio-tartratis ʒ ij. Sacchari Albi ʒ j. Adipis ʒ ix. Tere ut fiat unguentum.

Dr. Lichtenstein, a German physician, in a notice in Hufeland's Journ., asserts that the matter from tartar emetic pustules possess the same prophylactic power over small-pox as vaccination. He proved its power in thirty-one instances (?)

When taken in very large doses, tartar emetic acts as a corrosive poison, producing violent vomiting, hiccough, a sensation of burning in the stomach, colic, hypercatharsis, syncope, difficult respiration, convulsions, and death. It causes vomiting when it is applied to a wound. The treatment consists in evacuating the poison by bland, oily liquids, freely taken; after which decoction of yellow bark should be administered, with opium and local bleedings.[1]

Officinal preparations.— *Vinum antimonii Potassio-tartratis*, L. *Vinum antimoniale*, E. *Antimonii Tartarizati liquor*, D.

VINUM ANTIMONII POTASSIO-TARTRATIS, Lond.[2] *Wine of Potassio-tartrate of Antimony.*

"Take of crystals of potassio-tartrate of antimony, *two scruples;* sherry wine, *one pint.* Rub the crystals into powder, and dissolve."

VINUM ANTIMONIALE, Edin. *Antimonial Wine.*

"Take of tartar emetic, *two scruples;* sherry, *one pint.* Dissolve the salt in the wine."

ANTIMONII TARARIZATI LIQUOR, Dub. *Solution of Tartarized Antimony.*

"Take of tartarized antimony, *a drachm;* distilled water, *one pint;* rectified spirit, *seven fluid ounces.* Having dissolved the tartarized antimony in the water, and cleared the solution by passing it through a paper filter, add the spirit, and preserve the product in a well-stopped bottlle."

These solutions, when newly made, are about equal in point of strength, f ℥ j. of each containing grs. ij. of potassio-tartrate of antimony. When wine is used, a slow decomposition of the salt occurs: the precipitate appears to be an oxide of antimony, with a portion of bitartrate of potassa; arising, perhaps, from the potassa attracting

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[1] One fluid ounce of infusion of yellow bark is sufficient to completely decompose ℈ j. of tartar emetic.

[2] Vinum Antimonii tartarizati, P. L. 1787.

tartaric acid from the wine. Dr. Paris remarks, that when *good* sherry wine is employed no decomposition of the salt takes place; and if any precipitate occur, it is tartrate of lime, arising from an accidental impurity in the bitartrate of potassa of the preparation.[1]

Medical properties and uses. — These solutions are diaphoretic, or emetic, according to the extent of the dose. In doses of ♏x. to f ʒj., in any proper vehicle, repeated every three or four hours, they usually excite diaphoresis; but they are principally used as emetics for infants, a teaspoonful being given every five minutes until vomiting be excited.

PULVIS ANTIMONII COMPOSITUS, Lond. *Compound Antimonial Powder.*

"Take of tersulphuret of antimony, in powder, *a pound;* horn shavings, *two pounds.* Mix, and throw them into a white-hot crucible, assiduously stirring until vapours cease to arise. Rub what remains to powder, and having put it into a proper crucible, expose it to a fire, which is to be gradually raised, so as to keep it at a white heat for two hours. Triturate the residue into very fine powder."

PULVIS ANTIMONIALIS, Edin. Dub. *Antimonial Powder.*

"Take of sulphuret antimony, in coarse powder, hartshorn shavings, each, *equal weights.* Mix them, put them into a red-hot iron pot, and stir constantly till they acquire an ash-grey colour, and vapours no longer arise. Pulverize the product, put it into a crucible with a perforated cover, and expose this to a gradually-increasing heat till a white heat be produced, which is to be maintained for two hours. Reduce the product when cold to a fine powder."

Dublin.

"Take of tartarized antimony, phosphate of soda, of each, *four ounces;* chloride of calcium, *two ounces;* solution of ammonia, *four fluid ounces;* distilled water, *one gallon and a half,* or a sufficient quantity. Dissolve the tartarized antimony in half a gallon, and the phosphate of soda and chloride of calcium, each, in a quart of water. Mix the solutions of the tartarized antimony and phosphate of soda when cold, and then pour in the solution of chloride of calcium, having first added to the latter the water of ammonia. Boil now for twenty minutes, and, having collected the precipitate, which will have then formed, on a calico filter, wash it with hot distilled water until the liquid which passes through ceases to give a precipitate with a dilute solution of nitrate of silver. Finally, dry the product by a steam or water heat, and reduce it to a fine powder."

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[1] *Pharmacologia.*

In the two first processes, by the first exposure of the materials to the action of heat, the gelatin and the other principles of the hartshorn, except the phosphate of lime, are decomposed and dissipated; the sulphur of the sulphuret of antimony is at the same time expelled, and the metal is oxidized, the oxidizement being favoured by the frequent stirring. By the subsequent application of heat, the oxidizement of the metal is rendered more complete, and antimonious acid is formed. The phosphate of lime is merely mechanically mixed with the acid. In the third, or liquid process, by the action of the chloride of calcium on the phosphate of soda, the bone-earth phosphate of lime is produced, and by the action of the ammonia on the tartar emetic the teroxide of antimony is formed and precipitated along with the phosphate of lime; and the compound precipitate, after being washed and dried, forms the *Pulvis Antimonialis* of the Dublin Pharmacopœia. There is a great uncertainty in this preparation when prepared by heat. In two specimens analysed by Mr. Phillips, the one yielded 35, and the other 38 per cent. of antimonious acid. According to that chemist, the antimonial powder is a compound of 35 or 38 parts of antimonious acid + 65, in one specimen, and 62 in another, of phosphate of lime = 100.[1] According to an analysis of Dr. D. Maclagan, it contains 0·8 of antimonite of lime + 3·98 sesquioxide of antimony + 50·09 antimonious acid + 45·13 of subphosphate of lime = 100 00.[2] The process by heat, however, is still continued in two of the Pharmacopœias, from a desire of imitating, as closely as possible, the celebrated empirical preparation of Dr. James, "James's Powder," as a substitute for which this preparation was first introduced: and which, according to the analysis of Dr. Pearson, consists of 43 parts of phosphate of lime, and 57 of oxide of antimony, in 100 parts; according to Mr. Phillips, of 56 of antimonious acid + 44 of phosphate of lime, in 100 parts[3]; and according to Dr. Maclagan, of 3·40 antimonite of lime + 2·89 sesquioxide of antimony + 43·47 antimonious acid + 50·24 phosphate of lime.[4]

Qualities. — The antimonial powder of the London and Edinburgh Pharmacopœias is inodorous and insipid, of a dull white colour, insoluble in water, and only partially soluble in acids. Both differ from the true James's Powder, in which I have found a teroxide of antimony, to which it owes its efficacy, whilst the antimonial powder contains antimonious acid, which is inert.

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[1] *Ann. Phil.*, N. S. iv. 266. [2] *Edin. Med. and Surg. Journ.*, No. 135.

[3] *Phil. Trans.*, lxxxi. 317. Another analysis of this powder has been published lately by M. Pully, an Italian chemist, who gives the following as its constituents: seven parts of protoxide of antimony, four of phosphate of lime, four and a half of sulphate of potassa, and three and a half of potassa, holding in solution protoxide of antimony. *Annales de Chimie*, lv. 74. *Thomson's Chymistry*, 4th ed. iii. 315.

[4] The specimen was procured from Newberry. A specimen from Butler afforded 9·80 of teroxide of antimony.

Medical properties and uses. — Antimonial powder is intended to operate as a diaphoretic, alterative, emetic, or purgative, according to the extent of the dose, and the state or habit of the patient to whom it is administered. It is the preparation of antimony which was, until lately, most commonly employed in the commencement of fevers, and in inflammatory affections; being generally given with a view to its diaphoretic effect: and it is true that when a copious perspiration is early induced, after having previously evacuated the stomach and bowels, fevers of the most threatening aspect are often cut short by it; but too often it fails in producing this result, and, according to Dr. Elliotson's experiments, 100 grains have been given without producing any effect. That the specimens which I have employed have sometimes produced the intention expected, I can bear testimony: but justice obliges me to acknowledge that I have been as often disappointed; and every object for which antimonial powder can be prescribed is more certainly obtained from the employment of small doses of tartar emetic. Supposing that it is properly prepared, and acts like true James's Powder, I should say that those labouring under inflammatory diseases, who can bear considerable discharges by stool, experience the most benefit from the use of the antimonial powder, particularly when venesection has been previously employed. In acute rheumatism it is advantageously given, combined with camphor, calomel, and opium; and with calomel and guaiacum in several cutaneous affections. As it is insoluble in water, it is given either in the form of a powder, or made up in pills. The dose is from grs. iij. to ℈ j., repeated every fourth hour, diluting freely in the intervals, until its diaphoretic effects are obtained.

PRÆPARATA EX ARGENTO.

PREPARATIONS OF SILVER.

ARGENTI NITRAS, Edin. *Nitrate of Silver.*

"Take of pure silver, *an ounce and a half;* pure nitric acid, *one fluid ounce;* distilled water, *two fluid ounces.* Mix the acid and water, add the silver, and dissolve it with the aid of a gentle heat; increase the heat gradually till a dry salt be obtained; fuse the salt in an earthenware or porcelain crucible, and pour the fused matter into iron moulds, previously heated, and greased slightly with tallow. Preserve the product in glass vessels."

ARGENTI NITRAS FUSUM, Dub. *Fused Nitrate of Silver.*

"Take of refined silver, *three ounces;* pure nitric acid, *two fluid*

ounces; distilled water, *five ounces.* Place the silver in a flask, and, having poured upon it the acid and water, apply a gentle heat until the metal is dissolved. Transfer the solution to a porcelain capsule, decanting it off a heavy black powder, which appears at the bottom of the flask, and having evaporated it to dryness, raise the heat (in a dark room) until liquefaction is produced. Pour the melted nitrate of silver into a brass mould, furnished with cylindrical cavities of the size of a goose-quill, and which then admits of being opened by a hinge; and when the salt has concreted, remove it, and preserve it in well-stopped bottles, rendered impervious to light.

Syn. Nitrate d'Argent (*F.*), Salpetersaures Silber Wŏllenstein (*G.*), Azotnokis loe Serebro (*Russ.*), Nitrato di Argento Pietro infernale (*I.*).

In this process the acid is partly decomposed by the silver which is oxidized, and the oxide dissolved as it forms in the remaining acid. Three equivalents of silver take three of oxygen from one equivalent of the nitric acid: this forms the oxide, which requires three equivalents of nitric acid to form it into the nitrate. The effervescence is very violent, owing to the extrication of the nitrous gas (binoxide of nitrogen) of the decomposed acid, which flies off in orange-coloured fumes; part, however, is retained in the solution, and gives it a greenish-blue colour, which disappears as it cools. In this stage of the process, the silver held in solution is in the state of a nitrate, which, by due evaporation, may be obtained in brilliant, thin, hexangular, or right rhombic plates, having an intensely bitter metallic taste. By the subsequent melting, if the heat exceed 600°, it is decomposed, and a part of the acid is expelled.

Several minute particulars are necessary to be attended to in conducting the process. The silver should be perfectly free from any alloy of copper, which renders the salt more or less deliquescent. Its presence is indicated when the solution remains of a permanently greenish-blue colour, in which case it may be purified by repeated solutions and crystallizations, as long as tabular crystals are produced, the nitrate of copper being left in the mother-water. The acid employed should also be pure; for if hydrochloric or sulphuric acids be present, the solution is rendered turbid by the formation of a precipitate of sulphate and chloride of silver. For the same reasons the water should be pure; therefore, distilled water should be employed. The granular form of the silver is preferable to the lamellated form. For the subsequent evaporation and melting, a porcelain crucible should be used, as the fused silver is apt to sink into the substance of the common crucibles: it should be of ample size, to allow of the swelling and ebullition. The heat should not exceed 406°, nor be continued after the fusion is complete; for by continuing the application of

heat, the nitric acid is expelled, and the nitrate partially reduced: but it should be directly run into the iron moulds, or into a mass of well-tempered pipe-clay, perforated by means of a greased quill. The iron mould should be previously heated to prevent the sticks of nitrate of silver from becoming too brittle; and when cold, each piece must be cleansed from the grease, and separately rolled up in clean white paper.

Qualities. — Pure *crystallized* nitrate of silver is transparent, and colourless; but it is rarely kept in this state: the *fused* nitrate is in small, solid cylinders of a white colour, presenting, when broken across, a crystallized structure. It is inodorous; has an intensely bitter, metallic, caustic taste: it tinges the skin black, and the hair red, wherever it touches, owing to the reduction of the nitrate. It should not be deliquescent: the presence of copper in the preparation may always be suspected when this occurs. Copper may be detected by putting a piece of the suspected nitrate into liquor ammoniæ, which will form a blue solution if copper be present. Nitrate of silver is, also, sometimes adulterated with nitrate of potassa: but this may be detected by dissolving 100 parts of the suspected nitrate in distilled water, and adding *pure* hydrochloric acid in moderate excess. The precipitated chloride, when dried, should weigh 84 grains; and the mother-liquor, when evaporated, should leave no residuum; whilst nitrate of potassa remaining indicates both the nature and quantity of the adulteration. Nitrate of silver is soluble in an equal weight of water at 60°, and is also soluble in four times its weight of alcohol. It is not blackened and reduced by exposure to light unless some vegetable matter be present; but it is decomposed by a strong heat, by phosphorus, hydrogen gas, and the hydrosulphurets; is precipitated from its aqueous solution by phosphorus, mercury, copper, and some other metals; and is decomposed by the alkalies and their carbonates, with the exception of ammonia, and also by phosphates; by the alkaline earths, sulphuretted hydrogen, the hydrosulphurets, the sulphuric, hydrochloric, hydrocyanic, and arsenious acids, the majority of the neutral salts, and by astringent vegetable solutions and hard water. The formula for this salt is $Ag\,O, N\,O_5$.

Medical properties and uses. — Nitrate of silver is tonic, antispasmodic, and escharotic. It was introduced as an internal remedy by Angelus Sala, in the commencement of the 17th century. It is said to prove efficacious in epilepsy, not depending upon organic lesions, in angina pectoris, in chorea, and in that condition of the mucous membrane which occurs in typhus, and runs on to ulceration of the ileum and Peyer's glands. Boudin uses it both in the form of pill; and in solution, as an enema.[1] In these

[1] *Journ. de Connoissances Méd. Pratique*, May, 1838.

cases it is given in doses of one-eighth of a grain, gradually increased to grs. iv. or more, three times a day; but little advantage is gained, unless its use be preceded by a course of purgatives. The chief objection to the internal administration of nitrate of silver is the discoloration of the skin which it sometimes produces: but M. Sementini says, that this may be averted by the patient avoiding the light of sunshine.[1] I formerly suspected that the cause of this colour might be the change of the nitrate into the chloride, in the reticular tissue; but I have had reason to alter my opinion. I am, however, satisfied that nitric acid, highly diluted, and taken freely at the time of administering the nitrate of silver, will prevent the transformation of the nitrate into the chloride, and consequently the discoloration of the skin. How far it is useful, in the same cases, to avoid the use of chloride of sodium is undecided. The best form of administering this nitrate is that of pill made with crumb of bread, or any vegetable extract. It may be combined with musk, camphor, and opium.[2] But the chief use of nitrate of silver is for destroying strictures of the urethra, warts, fungous excrescences, and incipient chancres. In solution, in the proportion of grs. ij. to f ℥ j. of distilled water, it forms a good injection in fistulous sores; and, of half the strength, a lotion in an apthous state of the mouth; and in that disease of the gums generally denominated scurvy, in which the gum becomes spongy, and its edges hang loosely about the necks of the teeth. When this latter disease, however, rises to a great height, the sore edges of the gum should be touched with a hair-pencil dipped in a much stronger solution, in the proportion of ʒ j. of the nitrate of silver to f ℥ j. of distilled water.[3] I have found this strength of the solution, also, one of the best applications to erysipelas. The whole of the inflamed surface should be brushed over with it: in a few days the blackened cuticle peels off, the swelling having previously subsided, and a healthy cuticle remains. The same solution is also an admirable application in lupus, porrigo, and some forms of psoriasis. A solution of one part of the nitrate in 1000 parts of water is recommended by Hahnemann [4] as an application to old sores, and for healing the ulcers of the mouth produced by the use of mercurials. The solid caustic is sometimes employed to cut short the progress of the variolous pustule, and prevent after-pitting: it should be applied early. In the proportion of grs. x. to f ℥ j. of distilled water, it was introduced by Dr. Ridgeway as a remedy in the Egyptian ophthalmia; and has been found very beneficial. One drop or two drops are inserted into the eye

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[1] *Giornale di Fisica*, xi. p. 355.

[2] ℞ Argenti Nitratis gr. j., Camphoræ gr. xxiv., Opii Extracti gr. iij., Alcoholis ♏ iij. F. pilulæ sex, Sumatur j. ter quotidie.

[3] *Fox on the Natural History and Treatment of Diseases of the Teeth.*

[4] *Annales de Chimie*, iii. 308.

every second day.[1] It is the best application to ulcers, when their edges are pencilled with it according to the plan of Mr. Higginbottom. I have employed the solution of ʒ j. of the nitrate in f ℥ j. of distilled water, with unvarying success, in excoriations of the back in tedious illnesses.

When given in too large doses it acts as a poison on the system, producing symptoms resembling those induced by the other corrosive poisons. M. Orfila regards common salt as the antidote of this poison, when given sufficiently early to prevent the specific action of the nitrate on the coats of the stomach[2]: it is completely decomposed by a solution of common salt out of the body. When the antidote has not been administered very early, local and general bleeding, tepid baths, and emollient fomentations and clysters must be employed, if any symptom of abdominal inflammation be perceived.

LIQUOR ARGENTI NITRATIS, Lond. (Appendix.) *Solution of Nitrate of Silver.*

"Take of crystals of nitrate of silver, *a drachm;* distilled water, *a fluid ounce.* Dissolve and filter."

This solution is too strong for any purpose except as an escharotic, or as an application in ulcerated tonsils, and in erysipelas. It is chiefly useful as a test for the chlorides and hydrochloric acid.

SOLUTIO ARGENTI NITRATIS, Edin. (Tests.) *Solution of Nitrate of Silver.*

"Take of nitrate of silver, *forty grains;* distilled water, *sixteen hundred grains.* Dissolve the salt in the water, and keep the solution in well-closed bottles."

SOLUTIO ARGENTI AMMONIATI, Edin. (Tests.) *Ammoniated Solution of Silver.*

"Take of nitrate of silver, *forty-four grains;* distilled water, *one fluid ounce;* aqua ammonia, *a sufficiency.* Dissolve the salt in the water, and add the aqua ammonia gradually, and towards the end cautiously, till the precipitate at first thrown down is very nearly, but not entirely, redissolved.

Uses. — These solutions are introduced as tests. The latter is much used in testing for arsenious acid, with which it produces a lemon-yellow precipitate of arsenite of silver.

ARGENTI OXYDUM, Dub. *Oxide of Silver.*

"Take of nitrate of silver, *half an ounce;* lime-water, *half a gallon,* or *a sufficient quantity;* distilled water, *half a pint.* Dis-

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[1] *Med. and Phys. Journ.* Feb. 1825, p. 122. [2] *Traité des Poisons, &c.,* tom. i. p. 49.

solve the nitrate of silver in four ounces of the distilled water; and having poured the solution into a bottle containing the lime-water, shake the mixture well, and then set it by till the sediment subsides. The supernatant solution being drawn off, let the sediment be placed upon a filter, and when washed with the remainder of the distilled water, let it be dried at a heat not exceeding 212°, and preserved in a bottle."

By the action of the lime-water on the nitrate of silver, the oxide of silver is liberated, and a nitrate of lime formed, the former, being insoluble, subsides, the latter still remains in solution.

Qualities. — Oxide of silver occurs in the form of a dark olive-brown powder, soluble in acids forming salts, insoluble in solutions of potash or soda, but dissolved by liquor ammoniæ. It is readily decomposed by heat into oxygen and metallic silver.

Medical properties and uses. — It is employed as an internal remedy only, and seems to act in the same way as the nitrate: its local operation is, however, less active; and it is best suited to such cases, where the introduction of the metal into the system is desired, as in affections of the nervous system. It has been highly extolled by some as a remedy in mennorrhagia; by others it is thought not to be superior to the nitrate. Dose, gr. ½ to grs. ij. or grs. iij., in the form of pill.

PRÆPARATA EX ARSENICO.

PREPARATIONS OF ARSENIC.

ARSENICUM PURUM, Dub. *Pure Metallic Arsenic.*

"Take of white oxide of arsenic of commerce, *two drachms.* Place the oxide at the sealed end of a hard German glass tube of about half an inch in diameter and eighteen inches long, and, having covered it with about eight inches of dry and coarsely pulverized charcoal, and raised the portion of the tube containing the charcoal to a red heat, let a few ignited coals be placed beneath the oxide, so as to effect its slow sublimation. When this has been accomplished, the metallic arsenic will be found attached to the interior of the tube, at its distant or cool extremity. In conducting this process, the furnace used in the performance of an organic analysis should be employed, and the fuel should be ignited charcoal. It will be proper also to connect the open extremity of the tube with a flue, for the purpose of preventing the possible escape into the apartment of arsenical vapours; and with the view of keeping it by being plugged by the metal, to introduce occa-

sionally into it, as the sublimation proceeds, an iron wire through a cork fixed (but not air tight) in its open extremity."

Use. — To make the solution of hydriodate of arsenic and mercury.

ACIDUM ARSENIOSUM PURUM, Dub. *Pure Arsenious Acid.*

"Take of commercial white oxide of arsenic, *any convenient quantity.* Place it in a Florence flask, the neck of which is made to pass into that of a second flask of larger size, and, applying to the *former* a regulated heat, by suspending it beneath a semicylindric hood of sheet iron, a few inches above a small charcoal fire, cause the arsenic to sublime into the *latter.* This sublimation should be conducted under a flue with a good draught, so as to protect the operator from inhaling any vapours which may escape being condensed."

Syn. Oxide d'arsenique pure (*F.*), Weisses Arsenick (*G.*), Arsenico blanco (*I.*).

The greater part of the arsenious acid found in the shops is in the form of semivitreous cakes, which are the product of a second sublimation of the acid after it is obtained from roasting ores of cobalt. Although prepared on a great scale, yet it is as pure as sublimation can make it, and, therefore, this process is superfluous, and has been properly rejected by the London College: it is also not devoid of risk to the operator.

LIQUOR POTASSÆ ARSENITIS, Lond. LIQUOR ARSENICALIS, Edin. Dub. *Solution of Arsenite of Potassa. Arsenical Solution.*

"Take of arsenious acid, broken into small pieces[1], carbonate of potassa, of each, *eighty grains;* compound tincture of lavender, *five fluid drachms;* distilled water, *a pint.* Boil the arsenious acid and the potassa with half a pint of the water in a glass vessel until they are dissolved. Add to the solution, when it is cold, the compound spirit of lavender, and, finally, as much distilled water as will make the whole accurately up to a pint."

The proportions of the ingredients in the Edinburgh Liquor Arsenicalis are the same as those contained in the London Liquor Potassæ Arsenitis.

Dublin.

"Take of pure arsenious acid, pure carbonate of potash, of each, *seventy-two grains;* compound tincture of lavender, *half a fluid*

[1] The having the arsenious acid in small pieces secures it from the adulterations to which the powder is liable.

ounce; distilled water, *as much as is sufficient.* Introduce the arsenious acid and carbonate of potash into a flask containing half a pint of water, and boil until a perfect solution is obtained. When this has cooled, add to it the compound tincture of lavender, and as much water as will make the bulk of the entire one pint. The specific gravity of this solution is 1013."

The arsenious acid combines readily with alkalies, forming salts very soluble in water. In the above process, by its combination with the carbonate of potassa, the carbonic acid is driven off, and a solution is obtained of a uniform strength, by which very minute doses can be correctly and easily apportioned. It was introduced by Dr. Fowler, of Stafford, whose formula the London College has adopted, altering only the proportions of the water and the spirit of lavender, to make up the pint of the solution. The acid employed should be perfectly pure; the best test of which is its complete volatilization when heated.

Qualities. — This solution has the odour, taste, and colour of the compound spirit of lavender. It is decomposed by lime-water, hydrosulphurets, sulphate of magnesia, alum, sulphate of iron, nitrate of silver, and the salts of copper; and instantly forms a copious precipitate when dropped into infusion or decoction of cinchona bark; with which, therefore, it ought not to be conjoined in extemporaneous prescriptions.

Medical properties and uses. — The arsenical solution, as it is termed, is a powerful tonic and antiperiodic, useful in all the cases in which the acid can be employed. It was introduced by Dr. Fowler as a substitute for the celebrated empirical remedy known under the name of "The Ague Drop," which owes its efficacy to the arsenious acid. In addition to the account we have already given of the medicinal use of this acid, we have to add, that we have given this solution with decided advantage after cupping and purging, in threatened apoplexy, when the strength was little and the complexion pale. The dose is ♏ iv., gradually increased to as much as the habit will bear, given twice a day.

The arsenite of potassa may prove poisonous, and proofs of its administration may be legally required. The best method of proceeding is that recommended by M. Reinsch, namely, to acidulate the suspected fluid with hydrochloric acid, and to boil it with slips of metallic copper, which, if arsenic be present, become covered with a steel-grey crust of arsenic. To determine that it is an arsenical crust, wash the slip of copper with distilled water, and dry it; then place it in the centre of a glass tube sixteen inches long, and one end drawn out to a capillary tube, whilst the other end is bent up, and stopped with a perforated cork. The part of the tube containing the copper slip is now to be heated; and if the metal be arsenic, crystals of arsenious acid will form on the sides of the tube.

LIQUOR ARSENICI CHLORIDI, Lond. *Solution of Chloride of Arsenic.*

"Take of arsenious acid, broken into small pieces, *half a drachm;* hydrochloric acid, *a fluid drachm and a half;* distilled water, *a pint.* Boil the arsenious acid with the hydrochloric acid, mixed with an ounce of water until it be dissolved; then add as much water as may be necessary, so that it may accurately fill the measure of a pint."

Qualities. — This preparation is simply a solution of arsenious acid in dilute hydrochloric acid, and not a chloride of arsenic.

Uses. — The same as the Liquor Potassa Arsenitis. Dose, ♏ vi. to ♏ xx.

ARSENICI ET HYDRARGYRI HYDRIODATIS LIQUOR, Dub. *Solution of Hydriodate of Arsenic and Mercury.*

"Take of pure arsenic, in fine powder, *six grains;* pure mercury, *sixteen grains;* pure iodine, *fifty grains and a half;* alcohol, *half a fluid drachm;* distilled water, *nine ounces,* or *a sufficient quantity.* Rub together the arsenic, mercury, iodine, and spirit, until a dry mass is obtained, and having triturated eight ounces of the water with this in successive portions, let the whole be transferred to a flask, and heated until it begins to boil. When cooled and filtered, let as much distilled water be added to it as will make the bulk of the solution exactly eight fluid ounces and six drachms."

Uses. — This solution, generally known by the name of Donovan's Solution, has been much employed in the treatment of chronic cutaneous affections; and its use appears to have been attended with much success. Dr. Neligan states that, from his experience, he thinks that it is sometimes injurious, from the mercury contained in it. Dose, ♏ x. to ʒ ss.

PRÆPARATA E BARIO.

PREPARATIONS OF BARIUM.

MURIAS BARYTÆ, Edin. *Muriate of Baryta.*

"Take of carbonate of baryta, in fragments, *ten ounces;* pure muriatic acid, *half a pint;* distilled water, *two points.* Mix the acid and water; add the carbonate, broken, by degrees; apply a gentle heat towards the close of the effervescence, and when the action is over, filter; concentrate, and set the solution aside to crystallize." Or,

"Take of sulphate of baryta, *two pounds;* charcoal, in fine powder,

four ounces: pure muriatic acid, *a sufficiency.* Heat the sulphate to redness, pulverize it finely when cold, and mix it intimately with the charcoal. Subject the mixture to a low white heat for three hours in a covered crucible, pulverize the product, put it gradually into five pints of boiling water, and boil for five minutes; let it rest over a vapour-bath, pour off the clear liquor, and filter it if necessary, keeping it hot. Pour three pints of boiling water over the residuum, and proceed as before. Unite the two liquids, and whilst they are still hot, or, if cooled, after heating them again, add pure muriatic acid gradually as long as any effervescence is occasioned. In this process the solutions ought to be as little exposed to the air as possible; and in the last step the disengaged gas should be discharged by a proper tube into a chimney, or the ash-pit of a furnace. Strain the liquor, concentrate it, and set it aside to crystallize."

BARII CHLORIDUM, Dub. *Chloride of Barium.*

"Take of carbonate of barytes, coarsely powdered, *ten ounces;* pure muriatic acid, *eight fluid ounces;* distilled water, *as much as is sufficient.* Dilute the acid with a pint and a half of water; add the carbonate of barytes, and, when effervescence has ceased, evaporate to dryness. Transfer the residue to a Hessian crucible, and having exposed it to a low red heat for twenty minutes, suffer it to cool; then reduce it to a coarse powder, and boil it for ten minutes with a pint and a half of water. Pour off the solution, boil the undissolved residue with ten additional ounces of water, and again decant. Pass the decanted solutions through a paper filter, and having evaporated the resulting liquid to the bulk of about fourteen ounces, suffer it to cool, that crystals may be formed. The mother liquor, by further evaporation and cooling, will yield additional crystals." Or,

"Take of sulphate of barytes, *one pound and a half;* lamp-black, *four ounces;* pure muriatic acid, *fourteen fluid ounces;* distilled water, *a sufficient quantity.* Heat the sulphate of barytes in a covered crucible, and, while red-hot, throw it into distilled water. Let it now, after being reduced to a very fine powder, in the manner directed in the formula for *Creta Preparata,* be mixed intimately with the lamp-black, and exposed in a Hessian crucible for two hours to a strong red heat. The crucible being removed from the fire, and permitted to cool, its contents are to be reduced to a coarse powder and boiled for fifteen minutes with two quarts of water, after which the solution is to be poured off on a paper filter. The undissolved residue is to be again boiled with one quart of water, and the resulting liquor decanted on the same filter. To the filtered solutions, placed in a large capsule beneath a flue with a good draught, let the muriatic acid be gradually added, as long as it produces effervescence, and then, by means of a sand-

heat, evaporate to dryness. Boil the residuum with two quarts of water; pass the solution through a paper filter; and, having evaporated it down to one quart, suffer it to cool, that crystals may be formed. By further concentration the mother liquor will yield additional crystals."

Syn. Muriate de Baryte; Chlorure de Barium (*F.*), Salzsaure Schwererde Chlorbarium (*G.*), Muriato di Barita; Chlorure di Bario (*I.*), Zoutzuure Zuaaraarden (*Dutch*), Chloristoi bary (*Russ.*).

The simplicity of these processes recommends them. The hydrochloric acid first effects the decomposition of the carbonate of baryta, evolving the carbonic acid; both the acid and the baryta are next decomposed, and water and chloride of barium are formed. The last process may sometimes be required to be performed: it is somewhat more complicated, but the theory is sufficiently obvious.

The charcoal, by the assistance of heat, decomposes the sulphuric acid of the sulphate of baryta, attracting its oxygen, and forming with it carbonic acid, which is dissipated in a gaseous form, while the sulphur remains united with the barium. The boiling water added to this sulphuret dissolves it; but during the solution the water is partially decomposed: a portion of the sulphur attracts the oxygen of the decomposed water, forming sulphuric acid, which unites with a little of the baryta formed by the attraction of the barium for oxygen, so as to reproduce some sulphate, which precipitates; while its hydrogen unites with another portion of the sulphur, and forms sulphuretted hydrogen, the combination of which with the remaining sulphuret converts it into a hydrosulphuret, and prevents its further decomposition. Lastly, the hydrochloric acid added to the hot aqueous solution of these sulphurets is decomposed, and precipitates the sulphur; while at the same time the chlorine unites with the metal, and chloride of barium remains in solution.

Several other methods have been proposed for the preparation of this salt. The following is that recommended by Bouillon La Grange[1]:—Pulverize together equal parts of sulphate of baryta and chloride of calcium, project the mixture into a red-hot crucible, and let the fire be continued till the whole be melted, which is then to be poured out on a heated tile. After it is cold, reduce the mass to powder; boil it for some minutes in six times its weight of distilled water, and filter the solution; then evaporate the liquor to a pellicle, and set it aside to crystallize. The crystals require to be re-dissolved and again crystallized, to free them from any of the chloride of lime they may retain on the first crystallization. The College processes, however, are preferable to this of La Grange, as the previous calcination reduces any metallic salts

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[1] *Annales de Chimie*, xlvii. 131.

that may be combined with the sulphate; and being thus rendered insoluble, they are separated during the first solution of the sulphuret.[1]

Qualities. — Chloride of barium has an acrid, very nauseous, bitter taste. It crystallizes in grouped, rectangular, tables, bevelled on the edges; transparent, white, and very brilliant; of a specific gravity of 2·8257; and not alterable from exposure to the air, unless the atmosphere be very dry. When heated it decrepitates, becomes opaque, and ultimately melts, but is not decomposed. One part requires nearly three of water at 60° for its solution, and 2·20 of hot water. It is insoluble in alcohol, but is sparingly dissolved in rectified spirit. Its formula is Ba Cl + 2 HO. It is used only for forming the following solution: —

LIQUOR BARII CHLORIDI, Lond. (Appendix.) *Solution of Chloride of Barium.*

"Take of chloride of barium, *a drachm;* distilled water, *a fluid ounce.* Dissolve and filter."

SOLUTIO BARYTÆ MURIATIS, Edin. *Solution of Muriate of Baryta.*

"Take of muriate of baryta *one drachm;* distilled water, *one fluid ounce.* Dissolve the salt in the water."

BARII CHLORIDI LIQUOR, Dub. *Solution of Chloride of Barium.*

"Take of chloride of barium, *one ounce;* distilled water, *eight ounces.* Dissolve and filter through water. The specific gravity of this solution is 1088."

Syn. Dissolution de Muriate de Baryte (*F.*), Soluzione di Muriato di Barite (*I.*).

Qualities. — This solution is used chiefly as a test, being thrown down by carbonates, phosphates, and sulphates; the latter precipitate, however, is not dissolved, even by boiling nitric acid. The affinity of baryta for sulphuric acid is so great, that as a reagent it is capable of detecting 0·00009 of that acid in any fluid, forming with it an insoluble compound.

Medical properties and uses. — This solution is stimulant and deobstruent, and in large doses poisonous. It was introduced into practice by the late Dr. Crawford as a remedy for cancer and scrofula; and is strongly recommended by Professor Hufeland in the latter affection, when it attacks organs endowed with exquisite irri-

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[1] Goetling advises chloride of sodium to be added to the charcoal, which by a smaller quantity of charcoal is capable of reducing a larger quantity of snlphate of baryta. A mixture of one part of the chloride and two parts of chloride of calcium is sufficient to decompose six of the sulphate.

tability, as the eyes and lungs. Its use was afterwards extended to syphillis. When taken in moderate doses, it appears to increase the secretion by the skin, augments the flow of urine, and improves the tone of the system; but in large doses it causes violent vomiting, purging, and vertigo; and the most dangerous symptoms are produced. It also causes vomiting when it is applied to a wound. When death is the consequence, it is owing, as Sir B. Brodie has ascertained, to the poison acting on the brain and heart. It has undoubtedly been found beneficial in several instances of scrofula, in some cutaneous affections, and in ulcerations connected with elephantiasis; while in syphilis it has the power of suspending some of the symptoms for a short period. But although it be a medicine of some efficacy, yet, to use the words of Mr. Pearson, in whose opinion of its deficient powers as an antisyphilitic we place implicit faith, its "good qualities are uncertain in their operation, and narrowly circumscribed; nor is it a preparation on which great confidence can be placed for the cure of any disease."[1] The dose requires to be carefully apportioned, and very gradually increased, from ♏ v., which are sufficient at first, until ♏ xx. are taken twice a day, or more, if nausea be not excited.

It is sometimes used externally as an escharotic to fungous ulcers and specks on the cornea. It is a useful test of the soluble sulphates.

As antidotes of chloride of barium, when it has been taken as a poison, M. Orfila has proposed the soluble sulphates, "if administered before a quantity of the salt sufficient to exert its fatal influence on the nervous system be absorbed."[2] The best of these is the sulphate of soda.

BARYTÆ NITRAS, Edin. (Tests.) *Nitrate of Baryta.*

"The salt is to be prepared like the muriate of baryta, substituting pure nitric acid for the muriatic acid."

SOLUTIO BARYTÆ NITRATIS, Edin. (Tests.) *Solution of Nitrate of Baryta.*

"Take of nitrate of baryta, *forty grains;* distilled water, *eight hundred grains.* Dissolve the salt in the water, and keep the solution in well-closed bottles."

These preparations are useful as tests for sulphuric acid and sulphates.

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[1] *Observations on Remedies for Lues Venerea,* 92.

[2] *Traité de Poisons, &c.,* vol. i. p. 182.

PRÆPARATUM E BISMUTHO.

PREPARATION OF BISMUTH.

BISMUTHI NITRAS[1], Lond. *Nitrate of Bismuth.*

"Take of bismuth, *one ounce;* nitric acid, *one fluid ounce and a half;* distilled water, *three pints.* Mix a fluid ounce of the water with the acid, and dissolve the bismuth in the diluted acid by the aid of heat. Put this solution in the remaining water, and strain the mixture through a linen cloth, that the powder may be separated. Wash this with distilled water, and dry it with a gentle heat."

BISMUTHUM ALBUM, Edin. *White Bismuth.*

"Take of bismuth, in fine powder, *one ounce;* nitric acid (D. 1380), *one fluid ounce and a half;* water, *three pints.* Add the metal gradually to the acid, favouring the action with a gentle heat, and adding a very little distilled water as soon as crystals or a white powder may begin to form. When the solution is complete, pour the liquid into the water. Collect the precipitate immediately on a calico filter, wash it quickly with cold water, and dry it in a dark place."

BISMUTHI SUBNITRAS. Dub. *Subnitrate of Bismuth.*

"Take of bismuth, in small fragments, *two ounces;* pure nitric acid, *three fluid ounces;* distilled water, *one gallon.* Into the acid, first diluted with three ounces of the water, introduce the bismuth in successive portions; and having, when the spontaneous action has ceased, applied for ten minutes a heat approaching that of ebullition, decant the solution off any particles of metal which may remain undissolved. Evaporate the solution at a gentle heat, until it is reduced to two fluid ounces, and then pour it into half a gallon of the water. When the precipitate which forms has subsided, decant the supernatant liquid, and agitate the sediment with the remainder of the water. After twelve hours, again decant; and, having placed the precipitate on a filter, dry it at a temperature of 212°, and reduce it to powder."

Syn. (*Sub.*) Nitrate de Bismuth, Blanc de Ford (*F.*), Saltpetersaurer Wismuth (*G.*), Termassido Bianco de Bismuto (*I.*).

In this process, the nitric acid is partially decomposed, and the bismuth oxidized; and being thus rendered soluble, in the remain-

[1] Bismuthi Trisnitras, Ph. Lond. 1836.

der of the acid a solution of the nitrate of bismuth is obtained. This solution, when filtered, is colourless and transparent; reddens the tincture of litmus, and has a harsh, caustic taste; and, were the process stopped here, crystals of the nitrate might be readily obtained by evaporation. The affinity of the acid for the oxide in the nitrate is, nevertheless, so slight, that it can be separated from it by water; and this is effected in the second part of the process; for the water then added combining with the greater part of the acid, and depriving the oxide of its solubility, this is precipitated, in combination with some water, and the remainder of the acid, forming the nitrate or trisnitrate of bismuth.[1] The supernatant fluid contains in solution a nitrate of bismuth, with an excess of acid.

Qualities. — The nitrate or subnitrate of bismuth is a pure white, inodorous, insipid powder, which consists of minute crystals; sometimes it precipitates in larger crystals. It is soluble in the strong acids, from which it is readily precipitated by water; hence it is insoluble in that fluid, and, for the same reason, in very dilute acids. It is soluble in ammonia, although this salt precipitates it from the nitrate; but it is very sparingly soluble in potassa and soda. Its solution in water is blackened by sulphuretted hydrogen gas, and all the hydrosulphurets. When mixed with charcoal and exposed to a strong heat, the trisnitrate is decomposed, and the bismuth reduced to its metallic state. It becomes dark coloured when exposed to light if it contains silver. This salt is called now by the London College a nitrate; the equivalent of bismuth being trebled or made 212·85 in place of 70·95. The composition of the salt in 100 parts, according to Mr. Phillips, is, oxide of bismuth, 81·92; nitric acid, 18·36. By other chemists the proportions have been differently stated, and some water found in it. Its probable formula is, $H\,O, N\,O_5 + 3\,Bi\,O$; taking the eq. = 70·95; or, $Bi\,O_3, N\,O_5 + H\,O$: eq. = 212·85.

Medical properties and uses. — Nitrate of bismuth is tonic and antispasmodic. It has been advantageously administered in spasmodic affections, palpitations of the heart, and epilepsy. We have found it extremely beneficial in pyrosis, gastrodynia, and some other varieties of dyspepsia; in which cases we have usually combined it with extract of hops: and when there have been merely atony of the digestive organs, without organic mischief, it has proved almost uniformly successful.[2] Dr. Theophilus Thomson states, that in the diarrhœa occurring in phthisis it forms the most effectual remedy: he gives it with gum and magnesia.

The dose of the nitrate is from one grain to twelve or fifteen

[1] It was formerly known by the names of *Magistery of Bismuth* and *White Bismuth.*

[2] It was first employed in these cases by Professor Odier of Geneva. See *Manuel de Médecine Pratique, &c., par Louis Odier.*

grains. In very large doses, however, it acts with great violence, producing nausea, vomiting of a white, ropy matter, pains in the stomach, acute colic, heat of the chest, and alarming anxiety; and when these symptoms are accompanied with rigors, sighing, vertigo, and convulsions, the poison always proves fatal. Post-mortem examinations exhibit appearances of inflammation and ulceration of the stomach; inflammation of the duodenum and jejunum: the lungs are gorged with blood of a deep-red colour, so as to resemble liver. In cases of poisoning by nitrate of bismuth, both general and local blood-letting must be resorted to; whilst the patient should drink freely of milk and mucilaginous fluids. Fomentations and emollient glysters are also necessary: the degree of inflammation being such as to render the employment of ordinary purgatives hazardous.

When trisnitrate of bismuth has been employed as a poison, it is detected by its chemical properties, and the effects of re-agents upon it. When the whole has been taken, the only certain method of ascertaining the nature of the poison is to dry a portion of the vomited matter, or of the contents of the stomach if it have proved fatal; and to calcine the mass, mixed with charcoal, in a covered crucible, so as to reduce the metal, in which state it is easily recognised.

PRÆPARATA E CALCIO.

PREPARATIONS OF CALCIUM.

CALX, Edin. *Lime.*

"Heat white marble, broken into small fragments, in a covered crucible at a full-red heat for three hours, or till the residuum, when slacked and suspended in water, no longer effervesces on the addition of muriatic acid."

Syn. Chaux vive (*F.*), Kalk (*G.*), Brand ochoslacht kalk (*Swed.*), Calce (*I.*), Calviva (*S.*, *Port.*).

Lime for pharmaceutical purposes is required to be more completely burned than is usually the case with that which is obtained from the kilns; and perhaps it is with this view that the above preparations have been ordered by the Edinburgh College. It may, however, be observed, that chalk does not afford lime in a state of absolute purity; as it frequently contains silex, alumina, magnesia, and marine shells; and a portion of phosphate of lime,

which is not decomposed by the fire. White marble is to be preferred. To obtain pure lime, dissolve white marble in diluted hydrochloric acid, and to the filtered solution add solution of ammonia as long as any precipitate falls: then filter, and decompose the chloride by a solution of pure carbonate of potassa; wash the precipitate, and expose it to violent heat in a platinum crucible, till it cease to lose weight. The result is pure lime, fifty-six parts of which should be furnished for every 100 parts of pure white marble used.

Qualities. — Well-prepared lime is of a white colour, moderately hard, slightly sonorous, and brittle. Its specific gravity is 2·3. It is inodorous; has a hot, pungent, bitter taste; on animal matter it operates as a most powerful caustic; it changes the vegetable blues to green, and is infusible. Water poured on it is absorbed with a hissing noise, much heat is evolved, and the lime swells, falls to pieces, and is then said to be slacked; in which state, having combined with a portion of the water, it is a *hydrate* which parts with its water at a red heat. By exposure to the air it attracts carbonic acid, and again returns to the state of a carbonate or limestone. It is an oxide of *calcium*, and consists of 1 equiv. of calcium + 1 equiv. of oxygen: but slacked lime, or the hydrate, consists of 1 equivalent of lime + 1 equivalent of water.

Use. — Lime in this state is chiefly employed for pharmaceutical purposes, and for forming the solution. See *Calx*, Part II.

LIQUOR CALCIS, Lond. *Lime-water.*

"Take of lime, *half a pound;* distilled water, *twelve pints.* Add a little water to the lime, and when slacked add the remainder of the water, and shake them together; cover the vessel directly, and set it apart for three hours; then preserve the solution upon the undissolved lime in well-stopped glass bottles, and pour off the clear fluid when it is wanted for use."

AQUA CALCIS, Edin. *Lime-water.*

"Take any convenient quantity of water; pour a little of it over about $\frac{1}{20}$ of its weight of lime; when the lime is slacked, add it to the rest of the water; agitate well in a bottle; allow the undissolved matter to subside; pour off the clear liquor when it is wanted, replacing it with more water, and agitating briskly as before."

CALCIS LIQUOR, Dub. *Lime-water.*

"Take of fresh burned lime, with an ounce and a half of water, introduce it into a well-stoped bottle containing the remainder of the water, and shake well for the space of five minutes. After

twelve hours the excess of lime will have subsided, and the clear lime water may be drawn off with a syphon as it may be required. When the entire of the solution has been withdrawn, it may be renewed by shaking the sediment at the bottom of the bottle with another half gallon of water; and if the lime be pure, and the bottle be accurately stopped, this process may be successfully repeated three or four times."

Syn. Eau de Chaux (*F.*), Kalkwasser (*G.*), Kalkwater (*Dutch*), Aqua di Calce (*I.*).

By keeping the solution upon the lime, it is always in a completely saturated state, and the supernatant fluid is generally sufficiently clear to allow it to be decanted off without filtration. It is, however, advisable, in making the solution, first to slake the lime with a small portion of water, before the whole quantity be added; as by this it is prevented from running into a paste, which confines the action of the water. Cold water acts more powerfully on lime than hot water. From Mr. Phillips's experiments, tt appears that one pint of water at 212° dissolves 6·7 grains of lime; the same quantity of water at 60° dissolves 11·6 grains; and at 32° the quantity dissolved is increased to 13·25 grains. By heating cold, saturated lime-water, a crystalline deposition of hydrate of lime is thrown down.

Qualities. — Lime-water is inodorous; has a strong, styptic, acrid taste; is limpid and colourless; and changes to green the vegetable blue and red colours. It unites with oil, forming an imperfect soap. When exposed to the air it attracts carbonic acid, which, combining with part of the lime held in solution, forms on its surface a pellicle of carbonate of lime, which thickens, cracks, and sinks to the bottom of the vessel, leaving its place to be supplied by another pellicle; and thus, by successive formations, the whole of the lime is abstracted from the water. Hence the necessity of preserving the solution in well-closed bottles; and when it is filtered, in small bottles containing such a quantity only as can be used at once. It is decomposed by the acids and sulphur, the alkaline, carbonates, phosphates, borates, tartrates, and citrates; the infusions of orange-peel, columba, cinchona, rhubarb, and senna, which are consequently incompatible in formulæ with it.

Medical properties and uses. — Lime-water is tonic, antacid, anthelmintic, and externally detergent. It proves very useful in dyspepsia attended with much acidity, by neutralising the acid, and dissolving the sorded mucus with which the stomach is often loaded in this disease: it has also been found efficacious in diarrhœa, diabetes, and leucorrhœa. It destroys intestinal worms, and dissolves the mucus which forms their nidus; and, for the same reason, proves serviceable in slimy bowels. Its internal use, how-

ever, should be occasionally suspended for a few days, as its long continued action on the stomach is apt to prove hurtful. Externally it is applied as a lotion to foul and cancerous ulcers, porrigo, and scabies, but with little advantage.

The dose is from f ℥ ij. to O ss., alone or diluted with milk.

CALCII CHLORIDUM, Dub. *Chloride of Calcium.*

"Take of chalk, in small fragments, *two pounds;* pure muriatic acid, *two pints and a half;* distilled water, *six pints;* slaked lime, *as much as is sufficient.* Into the acid, first diluted with the water, introduce the chalk in successive portions, and when the effervescence has ceased, boil for ten minutes. Add now, stirring well, a very slight excess of slaked lime, and throw the whole upon a calico filter. Acidulate the filtered solution slightly by adding a few drops of muriatic acid; then evaporate it to dryness, and expose the residuum to a low red heat in a Hessian crucible. Finally, reduce the product rapidly to a coarse powder in a warm mortar, and enclose it in a well-stopped bottle."

CALCIS MURIAS, Edin. *Muriate of Lime.*

"Take of white marble, in fragments, *ten ounces;* muriatic acid (commercial) and water, of each *one pint.* Mix the acid and water; add the marble by degrees, and when the effervescence is over, add a little marble, in fine powder, till the liquor no longer reddens litmus; filter and concentrate to one half; put the remaining fluid in a cold place to crystallize; preserve the crystals in a well-closed bottle. More crystals will be obtained by concentrating the mother liquor."

This preparation is a chloride of calcium, and consists of 1 eq. of calcium + 1 eq. of chlorine. Formula Ca Cl.

Qualities. — Chloride of calcium is an inodorous, white, fusible, deliquescent, bitter, pungent salt: the Edinburgh preparation is crystalline, the Dublin occurs in a fused state. It is very soluble in both hot and cold water. It is soluble also in alcohol. During its solution much cold is produced; and if snow be used, a freezing mixture, capable of lowering the thermometer from 32° to − 50°, is obtained.

Its property of absorbing moisture, is often made use of in chemistry: thus it can be employed in organic analysis, and also to deprive alcohol and other fluids of any water dissolved in them.

CALCII CHLORIDI LIQUOR, Dub. *Solution of Chloride of Calcium.*

"Take of chloride of calcium, *three ounces;* distilled water, *twelve ounces.* Dissolve and filter through paper. The specific gravity of this solution is 1225."

CALCIS MURIATIS SOLUTIO, Edin. *Solution of Muriate of Lime.*

"Take of muriate of lime, *eight ounces;* water, *twelve fluid ounces.* Dissolve the salt in the water."

Syn. Dissolution de Muriate de Chaux (*F.*), Liquore di Muriato di Calce (*I.*).

Qualities. — This solution is colourless, and has a disagreeable, bitter, acrid, taste. It is decomposed by the sulphuric, nitric, phosphoric, fluoric, and boracic acids; the neutral salts into which these enter; and the alkaline carbonates, which precipitate the lime in the form of a carbonate.

Medical properties and uses. — Chloride of calcium is deobstruent and tonic. It was introduced into practice by Fourcroy, and has been much recommended as a remedy in scrofulous and glandular diseases. I have given it with evident advantage in bronchocele; and have witnessed more benefit result from its continued use in the varied forms of scrofula than from any other remedy. Its operation is similar to that of chloride of barium; but the danger of an over-dose is less to be dreaded, and its good effects are more uniform and certain. The dose of the solution is from ♏xx. to f℥j., increased gradually to f℥iv., in a sufficient quantity of water or milk, repeated twice or thrice a day.

CRETA PRÆPARATA, Edin. Dub. *Prepared Chalk.*

"Take *any convenient quantity* of chalk; triturate it well in a mortar with a little water, then pour it into a large vessel nearly full of water, and agitate briskly; allow it to rest for a short time and pour the milky water into another vessel in which the fine suspended chalk is to be left slowly to subside; repeat this process with the coarsely powdered chalk, which subsided quickly in the first vessel; collect the fine powder in the second vessel on a filter of linen or calico, and dry it."

Dublin.

"Take of chalk, *one pound;* water, *a sufficient quantity.* Reduce the chalk to a fine powder, and having triturated this in a large mortar with as much water as will give it the consistence of cream, fill the mortar with water, and stir well, giving the whole a circular motion, allow the mixture to stand for fifteen seconds, and then decant the milky liquid into a large vessel. Triturate what remains in the mortar, adding as much water as was previously used, and, after allowing it to settle for fifteen seconds, again decant, and let this process be repeated several times. Let the fine sediment which subsides from the decanted liquids be transferred to a calico filter, and dried, at a temperature not exceeding 212°."

Syn. Craie préparé (*F.*), Rein Kreide (*G.*), Carbonato di Calce preparato (*I.*).

By the suspension of the finer particles of the levigated chalk in water they are reduced to a more impalpable form, and are more effectually separated from the coarser particles than could be accomplished by any other mechanical means; but the chalk is not freed from the foreign earths it generally contains (see *Calx*, Part II.), although it be sufficiently pure for medicinal use.

Qualities. — This form of chalk is a white, opaque, soft, light substance. See Part II. *Creta.*

Medical properties and uses. — Chalk is antacid and absorbent. It is exhibited advantageously in acidities of the primæ viæ; and in diarrhœas, after all irritating matters have been removed from the bowels by previous evacuation. As an external application, it is sprinkled over ulcers discharging a thin ichorous matter, which is thus absorbed by the chalk, and prevented from excoriating the neighbouring sound skin. In cases of burns it is applied in a similar manner, and a poultice laid over it, by which the skinning of the sore is much hastened.[1]

The dose of chalk is from grs. x. to ℈ ij., or more.

Officinal preparations. — *Mistura Cretæ*, L. E. D. *Hydrargyrum cum Cretâ*, L. *Trochisci Cret*, E. *Pulvis Cretæ Composita*, L. E. D.

CALCIS CARBONAS PRÆCIPITATUM, Dub. *Precipitated Carbonate of Lime.*

"Take of chloride of calcium, *five ounces;* crystals of commercial carbonate of soda, *thirteen ounces;* boiling water, *two quarts.* Dissolve each salt in a quart of the water, mix the two solutions, and when the precipitate has subsided, draw off the supernatant liquor. Transfer the sediment to a calico filter, and wash it with boiling hot distilled water until the washings cease to give a precipitate with nitrate of silver. Finally, dry the product at a temperature not exceeding 212°."

A double exchange takes place in this process; the chlorine separates from the calcium and unites with the sodium of the carbonate of soda, while the carbonic acid combines with the lime: the chloride of sodium thus formed remains dissolved in the water, but the carbonate of lime is precipitated in the form of a white powder. It is an expensive preparation, and the benefit to be derived from a great degree of purity in this substance is not very obvious.

Qualities. — It is a compound of 1 eq. of carbonic acid + 1 eq. of lime. Formula CaO, CO_2.

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[1] *Kentish on Burns.*

CALCIS CHLORINATÆ LIQUOR, Dub. *Solution of Chlorinated Lime.*

"Take of chlorinated lime, *half a pound;* water, *half a gallon.* Blend well the water and chlorinated lime by trituration in a large mortar, and, having transferred the mixture to a stoppered bottle, let it be well shaken several times for the space of three hours. Pour out now the contents of the bottle on a calico filter, and let the solution which passes through be preserved in a well-stopped bottle. The specific gravity of this liquid is 1035."

This solution has all the properties of the Calx Chlorinata, Part II. It is employed as a disinfectant antidote, and also when it is required to administer the chlorinated lime internally, or to apply externally. Its dose is from f ʒ ss. to f ʒ j., diluted with water or any bland fluid.

CALCIS PHOSPHAS PRÆCIPITATUM, Dub. *Precipitated Phosphate of Lime.*

"Take of ox bones, burned to whiteness in a clear fire, *four ounces;* pure muriatic acid, *six fluid ounces;* distilled water, *one quart;* solution of ammonia, *eleven fluid ounces,* or *as much as may be sufficient.* Reduce the calcined bones to a fine powder, and digest upon this the acid, diluted with a pint of the water, until it is dissolved. To the solution, first cleared (if necessary), by filtration, add the remainder of the water, and then the solution of ammonia, until the mixture acquires an alkaline reaction, and, having collected the precipitate upon a calico filter, let it be washed with boiling distilled water as long as the liquid which passes through gives rise to a precipitate, when permitted to drop into a solution of nitrate of silver acidulated with nitric acid. The washed product should now be dried by exposing it for some days on porous bricks to a warm atmosphere."

Qualities. — This salt is named the bone-earth phosphate; it occurs as a white powder, insoluble in water, but soluble in the mineral acids, from which it is precipitated in a gelatinous form by ammonia. It consists of 3 eqs. of phosphoric acid, and 8 eqs. of lime. (Berrelius.) Formula $8\ Ca\,O + 3\ P\,O_5$.

Medical properties and uses. — Formerly it was given in Mollities ossium, but now it is very seldom employed: the bone earth, under the form of burnt or calcined bones, is employed in the preparation of phosphate of soda and phosphorus.

PRÆPARATA E CUPRO.

PREPARATIONS OF COPPER.

CUPRI SUBACETAS PRÆPARATUM, Dub. *Prepared Subacetate of Copper.*

"Take of subacetate of copper, *a convenient quantity.* Reduce it to powder, by careful trituration in a porcelain mortar, and separate the finer parts for use by means of a sieve."

Syn. Vert-de-gris (*F.*), Grünspan (*G.*), Acetato di Rame (*I.*), Cardenillo (*S.*).

By this process the subacetate of copper is obtained in a state of very minute mechanical division, better fitted for use, in the cases for which it is sometimes prescribed. (See *Ærugo*, Part II.)

CUPRI SULPHAS, Lond. *Sulphate of Copper.*

"Take of commercial sulphate of copper, *four pounds;* boiling distilled water, *four pints.* Pour the water on the sulphate, and apply heat, constantly stirring until it be liquefied; filter the solution while yet hot, and place it aside that crystals may be formed. Pour off the liquid and evaporate, that crystals may again form, then dry them all."

The commercial sulphate is often very impure, the London College has therefore ordered the above process for its purification. For properties and uses, see Part II., *Cupri Sulphas.*

CUPRI AMMONIO-SULPHAS, Lond. Dub. *Ammonio-Sulphate of Copper.*

"Take of sulphate of copper, *an ounce;* sesquicarbonate of ammonia, *an ounce and a half.* Rub them together until carbonic acid ceases to escape, then wrap up the ammonio-sulphate of copper in bibulous paper, and dry it in the air."

Dublin.

"Take of sulphate of copper, *two ounces;* commercial sesquicarbonate of ammonia, *three ounces.* Rub them together in a porcelain mortar, until effervescence has ceased, then roll up the residue in bibulous paper, and place it on a porous brick. When dry, let it be enclosed in a bottle, furnished with a well-fitted stopper."

CUPRUM AMMONIATUM, Edin. *Ammoniuret of Copper.*

"Take of sulphate of copper, *two ounces:* carbonate of ammonia, *three ounces.* Triturate them thoroughly together till effervescence ceases; wrap the product in blotting-paper, and dry it, first by folds of blotting-paper, afterwards by exposure to the air for a little; and preserve it in closely-stopped bottles."

Syn. Sulphate de Cuivre et d'Ammoniaque (*F.*), Schwefelsaures Kupfer oxyd-ammoniak; Kupfersalmiak (*G.*), Ammoniuro di Rame (*I.*).

During the trituration, in these processes, the sulphate of copper is partially decomposed, and part of its acid yielded up to the ammonia, which is consequently freed from the carbonic acid. The action of the affinities which produce these changes is aided by the water of crystallization of the ingredients becoming fluid. In drying the product, it must be very carefully excluded from the air.

Qualities. — This preparation has the odour of ammonia, a hot, styptic, metallic taste, and a rich azure-blue colour. By exposure to the air, it parts gradually with ammonia, the blue colour is lost, and the salt acquires a greenish hue. It consists of 1 eq. of sulphate of copper + 1 eq. of water + 2 eq. of ammonia; or of 1 eq. of the crystallized sulphate with four of the eq. of water of crystallization, replaced by 2 eq. of ammonia. Formula, $Cu\,O, S\,O_3\,(H\,O) + 2\,N\,H_3$.

The London College gives the following characters: — "Pulverulent; dark blue; at an intense heat it is changed into oxide of copper; first sesquicarbonate, and afterwards sulphate of ammonia being thrown off. It is soluble in water. This solution changes the colour of turmeric to brown; and arsenious acid being added, it turns green."

Medical properties and uses. — This salt of copper is emetic, tonic, and antispasmodic. It has been principally employed in epilepsy, as a remedy for which it was first proposed by Dr. Cullen; and has since his time been frequently employed with evident advantage, — although we must confess that in our trials of it the event has not been such as to encourage us to place much dependence on its powers for relieving this severe disease. It has also been given in chorea after a course of purgatives. It is less apt to excite nausea than the other preparations of copper. Cullen, however, recommends its use not to be continued for more than a month at a time; and adds, that after the first interval, if the disease continue, the most benefit will be derived from giving the medicine "only for some days before an expected accession."[1] It has been given with advantage in chorea, after a course of purgatives, combined with digitalis and myrrh.

The dose is one-fourth of a grain, gradually increased to grs v.,

[1] *Mat. Med.* ii. 25.

given twice a day, either simply made into pills with crumb of bread, or combined with valerian.

LIQUOR CUPRI AMMONIO SULPHATIS, Lond. CUPRI AMMONIATI SOLUTIO, Edin. *Solution of Ammonio-Sulphate of Copper.*

"Take of ammonio-sulphate of copper, *a drachm;* distilled water, *a pint.* Dissolve and filter." (The Edinburgh directions are the same.)

Medical properties and uses. — This solution is detergent, and mildly escharotic. It forms a useful local stimulant for cleaning foul, indolent ulcers, and disposing them to heal; and it is also employed, still more largely diluted, for removing specks from the cornea.

PRÆPARATA E FERRO.

PREPARATIONS OF IRON.

FERRI PULVIS, Dub. *Powder of Iron.*

"Take of peroxide of iron; zinc, in small pieces; oil of vitriol; water; of each *a sufficient quantity.* Introduce into a gun-barrel as much of the peroxide of iron as will occupy the length of about ten inches, confining it to the middle portion of the barrel by plugs of asbestos. Let the gun-barrel be now placed in such a furnace as is used for organic analysis, one end of it being fitted by means of a cork into a bent adapter, whose further extremity dips in water, while the other end (of barrel) is connected with a bottle containing the zinc and water, with the intervention, however, of a dessication tube, including fragments of caustic potash, and a small bottle half filled with oil of vitriol. Matters being thus arranged, a little oil of vitriol is to be poured into the bottle containing the water and zinc, with the view of developing a sufficiency of hydrogen to expel the air from the interior of the apparatus. As soon as this object is considered to have been accomplished, the part of the tube containing the peroxide of iron must be surrounded with ignited charcoal, and, when it is thus brought to a low red heat, the oil of vitriol is to be gradually added to the zinc, so as to cause a steady current of hydrogen to pass through the oil of vitriol and dessication tube into the gun-barrel. As soon as the reduction of the oxide is completed, which may be judged to have taken place when the gas bubbles escape at apparently the same rate through the water in which the adopter terminates, and through the bottle containing the oil of vitriol, the fire is to be removed (a slow current

of hydrogen being still continued); and when the gun-barrel has assumed the temperature of the air, its metallic contents should be extracted, and preserved in an accurately stopped bottle."

Medical properties and uses. — This preparation possesses all the valuable properties of iron filings, and is much better adapted for internal administration from its high state of division. It is very tasteless and readily acted upon by the juices of the stomach, and assimilated. It may be given in the form of pill, and has been much employed on the continent under the name of "Fer reduit." Dose gr. one to five or ten grains.

FERRI AMMONIO-CHLORIDUM, Lond. *Ammonio-Chloride of Iron.*[1]

"Take of sesquioxide of iron, *three ounces;* hydrochloric acid, *half a pint;* hydrochlorate of ammonia, *two pounds and a half;* distilled water, *three pints.* Mix the sesquioxide with the acid, and digest it in a sand-bath, frequently stirring until it be liquefied, then add the hydrochlorate first dissolved in the water; strain and evaporate the solution until the salt be dry; rub this into powder."

In this process of the London College the sesquioxide of iron is dissolved in the acid; hence the formation of a sesquichloride of iron and water. After the evaporation of the solution, the sesquichloride remains mixed with hydrochlorate of ammonia.

Qualities.—Ammonio-chloride of iron is not a definite compound, but a mixture consisting of 15 per cent. of sesquichloride of iron + 85 of hydrochlorate of ammonia. It has an odour resembling, in some degree, that of saffron, and a styptic taste. It is in crystalline grains of an orange-yellow colour; soluble in two parts of water, and also in alcohol; and deliquescent, on which account it requires to be preserved in very well-stopped phials. When decomposed by an alkali, it should yield about 7 per cent. of sesquioxide of iron.[2] It is incompatible with lime-water, liquor potassæ, and nitrate of silver. The following characters of this salt are given by the London College: — "Pulverulent, of an orange-colour, soluble in proof spirit and water: when potash is added to either solution ammonia is given off, and about seven grains of sesquioxide of iron are thrown down from 100 grains of this salt."

Medical properties and uses.—This preparation of iron is tonic, emmenagogue, and aperient. It was formerly much used in epilepsy, hysteria, chlorosis, scrofula, rickets, chronic rheumatism, and gout; but on account of the uncertainty of the preparation it

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[1] Ferrum ammoniacale, P. L. 1787, Flores Martiales, Ens Martis, Flores auri Calendulæ minerales.

[2] Phillips.

is now seldom prescribed. The dose is from grs. v. to grs. xx., given twice or thrice a day.

Officinal preparation.— *Tinctura Ferri Ammonio-chloridi*, L.

TINCTURA FERRI AMMONIO-CHLORIDI, Lond.

Tincture of Ammonio-Chloride of Iron.[1]

" Take of ammonio-chloride of iron, *four ounces;* proof spirit, distilled water, of each, *a pint.*[2] Dissolve and strain."

This preparation is simply a spirituous solution of the salt. " A fluid ounce of this solution, potash being added, throws down 5·8 grains of sesquioxide of iron." Dose f ʒ j. to f ʒ ij.

TINCTURA FERRI SESQUICHLORIDI, Lond. Dub.

Tincture of Sesquichloride of Iron.

" Take of sesquioxide of iron, *six ounces;* hydrochloric acid, *a pint;* rectified spirit, *three pints.* Mix the sesquioxide with the acid, and digest in a sand-bath, frequently shaking until it be dissolved. Then to the solution add the spirit and strain."

Dublin.

" Take of iron wire, *eight ounces ;* pure muriatic acid, *one quart;* pure nitric acid, *eighteen fluid drachms;* distilled water, *one pint;* rectified spirit, *one pint and a half.* Dilute the muriatic acid with the water, and having poured the mixture on the iron, apply a gentle heat until the metal is dissolved. Next add the nitric acid in successive portions, and then evaporate at a gentle heat until the solution is reduced to a pint. Finally, mix this in a bottle with the spirit, and, after the mixture has stood for twelve hours, draw off the clear tincture. The specific gravity of this tincture is 1237."

FERRI MURIATIS TINCTURA, Edin. *Tincture of Muriate of Iron.*

" Take of red oxide of iron, *six ounces;* muriatic acid (commercial), *one pint;* rectified spirit, *three pints.* Add the oxide to the acid in a glass vessel; digest with a gentle heat, and occasional agitation, for a day, or till most of the oxide be dissolved; then add the spirit, and filter."

Syn. Koch salzaure Eissentinktur (*G.*), Tinctura di muriato di Ferro (*I.*).

The sesquichloride is a compound of 2 eq. of iron + 3 eq. of chlo-

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[1] Tinctura Ferri Ammoniati, P. L. 1829.

[2] The London College omitted to place *dimidium* after *octarium* in their directions for preparing this tincture. (Phillip's Translation.)

rine. Formula, Fe^2Cl_3. It should have a sp. gr. of 0·992 when made according to the London directions, and 1·237 by the Dublin process; and a fluid ounce of the London tincture, potash being added, should yield nearly thirty grains of sesquioxide of iron. It contains, besides the sesquichloride, hydrochloric ether, a small portion of hydrochloric acid, and traces of protochloride of iron.

Qualities.—The alcoholic solution of sesquichloride of iron is of a brownish-yellow colour, has a peculiar ethereal odour, and an acid, very styptic taste. With the alkalies and their carbonates it gives a red precipitate. It is also precipitated by lime-water, carbonates of lime and magnesia; it strikes a black colour with infusions of astringent vegetables, a blue with ferrocyanide of potassium, and forms with mucilage of acacia gum an orange-coloured jelly. Hence these substances cannot enter into compositions with this tincture. Many of the specimens of this tincture contain a little sulphuric acid, owing to the impurity of the hydrochloric acid.

Medical properties and uses.—This is an active and elegant preparation of iron, well adapted for all the diseases in which chalybeates prove serviceable. I have found it more useful than any other tonic in scrofula; when it is given in doses, gradually increased, until twenty or thirty drops be taken for a dose, twice a day. It is, also, in my opinion, the best chalybeate in atonic dyspepsia. It is also recommended in dysury depending on spasmodic stricture of the urethra, in which case it is given in doses of five or six drops, repeated every ten or fifteen minutes, until nausea be induced. It is used externally as a styptic in cancerous and loose fungous sores. The usual dose is from ♏x. to ♏xxx., in a glass of water, but it may be gradually increased to ♏cxx.

FERRI ACETATIS TINCTURA, Dub. *Tincture of Acetate of Iron.*

"Take of sulphate of iron, *eight ounces;* distilled water, *half a pint;* pure sulphuric acid, *six fluid drachms;* pure nitric acid, *half a fluid ounce;* rectified spirit, *half a gallon.* To nine ounces of the water add the sulphuric acid, and in the mixture, with the aid of heat, dissolve the sulphate of iron. Add next the nitric acid, first diluted with the remaining ounce of water, and evaporate the resulting solution to the consistence of a thick syrup. Dissolve this in one quart, and the acetate of potash in the remainder of the spirit, and having mixed the solutions, and shaken the mixture repeatedly in a large bottle, let the whole be thrown upon a calico filter. When any further liquid ceases to trickle through, subject the filter, with its contents, to expression, and, having cleared the turbid tincture thus procured by filtration through paper, let it be added to that already obtained. The specific gravity of this tincture is 891."

Syn. Teinture de l'acétate de Fer (*F.*), Tinturo di Marte astringente (*I.*).

In this process, a persulphate of iron is first formed, by the oxidising agency of the nitric acid; on the addition of the acetate of potash, double decomposition takes place, and a sulphate of potash, insoluble in spirit, together with the soluble acetate of peroxide of iron, are formed.

Qualities.— This preparation has a claret colour, a peculiar ethereal odour, and a warm, styptic taste. They are decomposed by the alkalies and their carbonates, and the strong acids, and by infusions of astringent vegetables, which are, therefore, incompatible in formulæ with them.

Medical properties and uses.— The spirituous solution of acetate of iron possesses the same properties as the other preparations of this metal; every advantage that can be expected from the acetate can be equally obtained from the potassio-tartrate of iron. The dose of the tincture may be from ♏ xx. to f ʒ j., given in a sufficient quantity of water, or any other proper vehicle.

FERRI PERNITRAS LIQUOR, Dub. *Solution of Pernitrate of Iron.*

"Take of fine iron wire, free from rust, *one ounce;* pure nitric acid, *three fluid ounces;* distilled water, *a sufficient quantity.* Into the acid, first diluted with sixteen ounces of the water, introduce the iron wire, and leave them in contact until gas ceases to be disengaged. Filter the solution, and to it add as much water as will make its bulk one pint and a half. The specific gravity of this solution is 1107." When iron is dissolved in dilute nitric acid it is peroxidized acid, and then formed into a pernitrate of iron ($Fe_2 O_3 + 3 N O_5$).

Qualities. — It occurs as a dark, red-coloured transparent liquid, of an astringent taste; it is, however, apt to become turbid by keeping: this change is prevented by the addition of a little hydrochloric acid. It was first introduced into medicine by Mr. Kerr, of Glasgow.

Medical properties and uses. — It acts as an astringent and tonic, and has been highly extolled by many physicians: It may be employed in the same cases as the tincture of the sesquichloride of iron, as in passive hæmorrhages, mucous discharges, low forms of diarrhœa, not accompanied with ulceration, also as a chalybeate. Dose ft. ʒ ss. to ʒ j. for the adult; ♏ x to ♏ xxx. for children.

FERRI IODIDUM, Edin. Dub. *Iodide of Iron.*

"Take *any convenient quantity* of iodine, iron wire, and distilled water, in the proportions for making solution of iodide of iron (*Ferri Iodidi Syrupus*). Proceed as directed for that process; but before filtering the solution concentrate it to one-sixth of its

volume, without removing the excess of iron wire. Put the filtered liquor quickly in an evaporating basin, along with twelve times its weight of quick-lime around the basin, in some convenient apparatus in which it may be shut up accurately in a small space not communicating with the general atmosphere. Heat the whole apparatus in a hot-air press, or otherwise, until the water be entirely evaporated; and preserve the dry iodide in small well-closed bottles."

Dublin.

"Take of pure iodine, *one ounce;* filings or thin turnings of wrought tin, separated from impurities by a magnet, *half an ounce;* distilled water, *five ounces.* Introduce the iodine, iron, and four ounces of the water into a Florence flask, and, having heated the mixture gently for ten minutes, boil until the solution loses its red colour. Pass the liquid now through paper into a second flask, washing the filter with the remaining ounce of water, and, by means of a regulated heat, boil down the liquor until a drop of it taken out on the end of an iron wire solidifies on cooling. When the flask has assumed the temperature of the air, let the iodide of iron be extracted from it (by breaking the flask if necessary), and, after it has been submitted to powerful pressure, enveloped in blotting paper, let it be enclosed in a well-stopped bottle."

In this process the union of the iron and iodine is direct; and these two nearly insoluble substances form a very soluble compound. I have found the soft iron wire used for stringing pianofortes preferable to the filings; and as the iodine combines with a definite quantity, the operator need not be particular in the proportions, except that the iron should be in excess, and the combination aided by boiling. The evaporation of the solution should be conducted in a common Florence flask, which, as soon as the evaporation is completed, should be rapidly cooled by pouring cold water on it, then broken to pieces, and the preparation instantly bottled and the bottles well corked. It is, however, preferable to preserve this iodide in solution of the strength of three grains to the drachm; and it can always be maintained of the same strength by keeping, in the bottle, a coil of soft iron wire.[1]

Qualities. — Solid iodide of iron, when well prepared, may be obtained in masses of beautiful, acicular crystals of a greenish colour; but its usual form is an opaque, crystalline mass, closely resembling masses of crystallized iron in appearance. It is extremely deliquescent; and as it becomes moist the iron is oxidized, separates from the iodine, and a sesquioxide is deposited. This is

[1] The merit of suggesting this mode of preserving the solution is due to my friend Mr. Squire, of Oxford Street.

also the case when the solution is exposed to the air; but when a coil of soft iron wire is kept in the bottle, the iodine set free reacts upon the soft iron, and the iodide is again formed, so that the solution is always of the same strength, although a quantity of sesquioxide of iron may form and accumulate in the bottle.

This preparation is a protiodide consisting of one eq. of iodine + 1 eq. of iron. Formula Fe I.

Its solutions are decomposed by the strong acids, chlorine, the alkalies, ammonia, and their carbonates, by lime-water, chloride of calcium, bichloride of mercury, acetate of lead, and all astringent vegetable infusions and decoctions.

Medical properties and uses. — The extreme solubility of this compound, formed of two very active but little soluble bases, led me to introduce it to the notice of British practitioners as a powerful therapeutic agent.[1] It is rapidly carried into the circulation, and may be detected in the urine and other secretions by testing them with chlorine and starch a short time after the iodide has been taken. It operates as a stimulant to the glandular system, whilst at the same time the iron supports and improves the tone of the habit. I have found it beneficial in scrofula in all its forms, pseudo-syphilis, chlorosis, atonic amenorrhœa, hysteria, and incipient cancer. It has also been successfully employed in phthisis by M. Du Pasquier. In secondary syphilis, in which I have also found it useful, when given at the same time with a slight mercurial alterative, it may be combined with iodide of potassium; and in incipient cancer its efficacy is aided by the administration of iodide of arsenic at the same time. I have found it serviceable in atonic gastric dyspepsia, when combined with bicarbonate of potassa, and taken at the moment of admixture. The ordinary dose is from grs. iij. to grs. viij. or more. M. Ricord has used it topically as an injection in leucorrhœa; and as a lotion in cancerous ulcers.[2]

FERRI IODIDI SYRUPUS, Lond. Edin. Dub. *Syrup of Iodide of Iron.*

"Take of iodine, *an ounce;* iron drawn into wire, *three drachms;* distilled water, *twelve fluid ounces,* or *as much as may be necessary;* sugar, *ten ounces.* Mix the iodine and iron with eight fluid ounces of water, and heat until the solution assumes a greenish colour, then strain. Evaporate the solution to about four fluid ounces, and add to it the sugar. Lastly, when the syrup has cooled, add as much water as may be necessary, that it may fill the measure of fifteen ounces, and keep it in a well-stoppered black glass vessel."

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[1] See *Essay on the Ioduret of Iron,* by A. T. Thomson, M.D., 1834.
[2] *Journ. de Pharm.,* xxiii. 303.

Edinburgh.

"Take of iodine (dry), *two hundred grains;* fine iron wire, recently cleaned, *one hundred grains;* white sugar, in powder, *four ounces and a half;* distilled water, *six fluid ounces.* Boil the iodine, iron, and water together in a glass mattrass, at first gently, to avoid the expulsion of iodine vapours, afterwards briskly, until about two fluid ounces of liquid remain. Filter this quickly, while hot, into a mattrass containing the sugar; dissolve the sugar with a gentle heat; and add distilled water, if necessary, to make up six fluid ounces. Twelve minims contain one grain of iodide of iron."

Dublin.

"Take of pure iodine, *five drachms;* iron turnings, separated by a magnet, *three drachms;* distilled water, *two ounces;* simple syrup, *six fluid ounces.* Introduce the iodine, iron, and water into a glass flask, and apply a moderate heat, until the solution loses its red colour. Filter the solution, while hot, into a bottle containing the syrup, mix with agitation, and add distilled water, to make up eight fluid ounces. One fluid drachm contains about five grains of iodide of iron."

The strength of these syrups is nearly equal, a fluid drachm containing about five grains of the iodide. In England, before the appearance of the new Pharmacopœia, a syrup containing three grains was usually employed. The syrup protects the iodide from decomposition, but the preparation should be kept in well-stopped bottles.

Uses. — As the iodide of iron. Dose, f ʒ ss. to f ʒ jss.

FERRI NIGRUM OXIDUM, Edin. *Black Oxide of Iron.*

"Take of sulphate of iron, *six ounces;* sulphuric acid (commercial), *two fluid drachms and two fluid scruples;* pure nitric acid, *four fluid drachms and a half;* stronger aqua ammoniæ, *four fluid ounces and a half;* boiling water, *three pints.* Dissolve half the sulphate in half the boiling water, and add the sulphuric acid; boil; add the nitric acid by degrees, boiling the liquid after each addition briskly for a few minutes. Dissolve the rest of the sulphate in the rest of the boiling water; mix thoroughly the two solutions; and immediately add the ammonia in a full stream, stirring the mixture at the same time briskly. Collect the black powder on a calico-filter; wash it with water till the water is scarcely precipitated by solution of nitrate of baryta; and dry it at a temperature not exceeding 180°."

FERRI OXYDUM MAGNETICUM, Dub. *Magnetic Oxide of Iron.*

"Take of sulphate of iron, *twelve ounces;* solution of caustic

potash, *fifty-four ounces;* distilled water, *a sufficient quantity.* Convert, as is directed in the formula for *Ferri Peroxydum Hydratum,* eight ounces of the sulphate of iron into a persulphate. To the solution thus obtained add the four remaining ounces of the sulphate of iron, first dissolved in half a pint of distilled water. Mix well the resulting liquid with the solution of caustic potash, and having boiled for five minutes in an iron vessel, collect the precipitate on a calico-filter, and wash it with boiling distilled water until the liquid which passes through ceases to give a precipitate when dropped into a solution of chloride of barium. Lastly, let the precipitate be dried by a steam or water heat, having been first reduced to a fine powder, let it be inclosed in a well-stopped bottle."

Syn. L'oxide noir de Fer (*F.*), Schwarzesgesauertes Eisen (*G.*), Ossido nero di Ferro (*I.*).

In these processes, the precipitate formed by the addition of ammonia or potassa, to the solution of the salts of iron produced by the action of the two acids on the sulphate of iron is a mixture of the protoxide and sesquioxide, which remains permanent. In the Dublin process, two-thirds of the sulphate are ordered to be per-oxidized; in the Edinburgh, one half. The preparation, made according to the last, must therefore contain twice as much of the protoxide.

Qualities. — This oxide has the same magnetic property and composition as the magnetic iron ore, except that it contains a small amount of water. It occurs as a greyish black powder, dissolving in hydrochloric acid, without the evolution of hydrogen, which takes place when any metallic iron is present; it is an admixture of two oxides, namely, of the protoxide and the sesquioxide. Formula, $Fe\,O + Fe_2\,O_3$.

Medical properties and uses. — This mixed oxide is tonic and anthelmintic. It is efficaciously administered in general debility, dyspepsia, chlorosis, and worm cases. Its utility is determined by its meeting with acid in the stomach, which is known to be the case by the disagreeable eructations it produces, and the black colour of the alvine evacuations. The dose is from grs. v. to ℈j., combined with any aromatic powder, or formed into an electuary with honey, and taken twice a day.

FERRI OXIDUM RUBRUM, Edin. *Red Oxide of Iron.* See *Ferri Sesquioxidum.*

FERRI POTASSIO-TARTRAS, Lond. *Potassio-tartrate of Iron.*

"Take of sulphate of iron, *four ounces;* sulphuric acid, *half a fluid ounce;* nitric acid, *a fluid ounce;* solution of ammonia, *ten*

fluid ounces; bitartrate of potash, powdered, *two ounces;* distilled water, *four gallons.* Dissolve the sulphate in a pint of water with the sulphuric acid; then, heat being applied, gradually add the nitric acid. Boil the solution to the consistence of syrup, and mix with the rest of the water; then add the ammonia to throw down the sesquioxide. Wash this, and place it aside for twenty-four hours; then heat the bitartrate, mixed in half a pint of distilled water, to 140°, and to it gradually add the moist sesquioxide, the supernatant water being poured off. Separate by means of a linen cloth whatever of this oxide fails to be dissolved; then evaporate the clear liquor until the salt be dried. But the potassio tartrate of iron may be dried in the same way as the ammonio-citrate of iron."

FERRUM TARTARIZATUM, Edin. Dub. *Tartrate of Potassa and of Iron.*

"Take of sulphate of iron, *five ounces;* bitartrate of potassa, *five ounces and one drachm;* carbonate of ammonia, in fine powder, *a sufficiency.* Prepare the rust of iron from the sulphate, as directed under *Ferrugo,* and without drying it. Mix the pulpy mass with four pints of water; add the bitartrate; boil till the rust of iron is dissolved; let the solution cool; pour off the clear liquid, and add to this the carbonate of ammonia so long as it occasions effervescence. Concentrate the liquid over the vapour-bath to the consistence of a thick extract, or till the residuum becomes on cooling a firm solid, which must be preserved in well-closed vessels."

Dublin.

"Take of sulphate of iron, *eight ounces;* white bitartrate of potash, *five ounces;* distilled water, *one pint and a half.* From the sulphate of iron prepare hydrated peroxide of iron, by the process given for *Ferri Peroxydum hydratum,* D., and having, immediately after it is washed, placed it with the bitartrate of potash and water in a porcelain capsule, apply heat to the mixture (taking care, however, that the temperature does not rise beyond 150°), and stir it occasionally for six hours. Let the solution, after it has cooled down to the temperature of the atmosphere, be decanted off any undissolved oxide of iron; and, having transferred it in small quantities to delf dinner plates, let it be evaporated to dryness at a heat not exceeding 150°. Lastly, chip off the film of dry salt which adheres to the plates, and preserve it in well-stopped bottles."

Syn. Tartrate de Fer et de Potasse (*F.*), Eisenweinstein (*G.*), Tartrato di Potassa e di Ossido di Ferro (*I.*), Vinnokisloe Kali s okisin geleza (*Russ.*).

Qualities. — Potassio-tartrate of iron is inodorous, has a slightly styptic taste, and is of a brownish-green colour. It is soluble in four parts of water; slightly in rectified spirit; and very soluble in proof spirit and in wine; and deliquesces, in some degree, when exposed to the air, so as to require to be kept in closely-stopped phials. The cold solution of the alkalies and their carbonates do not decompose this salt; but it is instantly decomposed when boiled with any one of them, although ammonia and its carbonate in neither state affect it. The weak or diluted acids do not decompose it; but lime-water, hydrosulphuret of potassa, and infusions of astringent vegetables decompose it, and are, therefore, incompatible in formulæ with it. The composition of this salt is variable: the Edinburgh contains about 18 per cent. of sesquioxide of iron.

According to the London College, this salt is "Soluble in water. This solution changes neither the colour of litmus nor turmeric; neither, ferrocyanide of potassium being added, is it turned blue, nor is anything thrown down by any alkali. Should it be heated with potash, 100 grains throws down about 34 grains of the sesquioxide of iron."

Medical properties and uses. — This salt possesses the same medicinal powers as the other preparations of iron; but from its mildness, slight taste, and ready solubility, it is a more convenient form for the administration of iron to children; and in many cases in which the other saline preparations of it prove nauseating, and sit uneasy on the stomach. It is advantageously given in all the cases in which chalybeates prove useful; and is also extolled as a remedy in dropsy, in which it is supposed to exert both a diuretic and a tonic power. The dose is from grs. x. to ʒ ss., given either in a state of solution, or in the form of powder or pill combined with an aromatic or a bitter, such as the extract of gentian.

FERRI AMMONIO-CITRAS. Lond. Dub. *Ammonio-citrate of Iron.*

"Take of sulphate of iron, *twelve ounces;* carbonate of soda, *twelve ounces and a half;* citric acid, *six ounces;* solution of ammonia, *nine fluid ounces;* boiling distilled water, *twelve pints.* Dissolve the sulphate and carbonate separately, in six pints of water. Mix the solutions, yet hot, and set by, that the precipitate may subside. The supernatant liquor being poured off, wash the precipitate frequently with water, and, the acid being added, dissolve it by the aid of heat. Then, when it has cooled, add the ammonia, and evaporate to the consistence of syrup. Dry this with a gentle heat, spread thinly on flat earthenware plates; and let it be kept in a well-closed vessel."

Dublin.

"Take of citric acid, *four ounces;* distilled water, *sixteen ounces;* sulphate of iron, *five ounces;* solution of ammonia, *four fluid ounces,* or, *as much as is sufficient.* Dissolve the citric acid in the water with the aid of heat; and, having converted the sulphate of iron into the hydrated peroxide of iron, as directed in the formulæ for *Ferri Peroxydum Hydratum,* introduce the product into a capsule containing the solution of citric acid, and heat for twenty minutes at a temperature not exceeding 140°. When the solution has cooled, add, constantly stirring, the ammonia in slight excess; and having transferred the solution thus obtained to delf dinner plates, evaporate it to dryness by a steam or water heat. Lastly, chip off the film of dry salt which adheres to the plates, and preserve it in well-stopped bottles."

The processes of the London and Dublin Colleges resemble each other very closely. In the London process, a peroxide of iron containing some carbonate is first formed, by the precipitation of the sulphate of that metal by means of carbonate of soda, and repeatedly washing the precipitate; this is afterwards united with citric acid, and ammonia added in slight excess, by which means a double citrate of iron and ammonia is formed. In the Dublin process the oxidation of the iron is rendered more complete by the use of nitric acid in the first part of the operation; in other respects it resembles the London process.

Qualities. — Ammonio-citrate of iron occurs usually in thin transparent garnet-coloured scales; having a sweetish, slightly styptic taste. The London College gives the following characters of this salt: —

"It is soluble in water. The solution does not change the colour of litmus or turmeric, nor become blue with ferrocyanide of potassium; but potash or lime-water being added, sesquioxide of iron is precipitated, and ammonia evolved. From 100 grains dissolved in water, by the addition of potash, 34 grains of sesquioxide of iron are precipitated." Its exact composition is not known, and probably varies much. It contains a citrate of the peroxide of iron and of ammonia.

Medical properties and uses. — This preparation is a mild chalybeate, well adapted, on account of its slight taste and ready solubility, for administration to children and delicate persons. When porter is not contra-indicated, it may be conveniently given in that menstruum, which completely hides its taste. It may be also given in many cases where most of the other preparations of iron are apt to irritate the digestive functions. In anæmia it doubtless acts in restoring the condition of the blood; but it is

questionable whether its operation is equal to the proto-salts in this affection.

FERRI SULPHURETUM, Edin. Dub. *Sulphuret of Iron.*

"The best sulphuret of iron is made by heating an iron rod to a full white heat in a forge, and rubbing it with a roll of sulphur over a deep vessel filled with water to receive the fused globules of sulphuret which form. An inferior sort, good enough, however, for pharmaceutic purposes, is obtained by heating one part of sublimed sulphur and three of iron filings in a crucible in a common fire till the mixture begins to glow, and then removing the crucible and covering it, until the action, which at first increases considerably, shall come to an end."

Dublin.

"Take of rods of iron of the size employed in the manufacture of nails, *any convenient number.* Having raised them to a strong red or white heat, apply them in succession by their heated extremities to sticks of sulphur, operating so that the melted sulphuret, as it is formed, may drop into a stone cistern filled with water, and be thus protected from oxidation. The water being poured off, let the product be separated from the sulphur with which it is mixed, and, when dried, let it be enclosed in a well-stopped bottle."

These processes are intended to form a protosulphuret, but it is only by the *first* of the Edinburgh processes that a pure sulphuret is obtained. The sulphuret is intended for procuring hydrosulphuric acid, by decomposing it with diluted sulphuric acid. It is never employed either as an external or an internal medicine.

FERRI SESQUIOXYDUM, Lond. *Sesquioxide of Iron.*[1]

"Take of sulphate of iron, *four pounds;* carbonate of soda, *four pounds two ounces;* boiling water, *six gallons.* Dissolve separately the sulphate of iron and the carbonate of soda in three gallons of the water; then mix together the solutions, while yet hot, and set the mixture aside, that the powder may subside; then pour off the supernatant fluid; wash frequently the precipitate in water, and dry it."

FERRI OXIDUM RUBRUM, Edin. *Red Oxide of Iron.*

"Take of sulphate of iron, *four ounces;* carbonate of soda, *five*

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[1] Chalybs præparatus è aceto, et sine aceto, P. L. 1720. Chalybis rubigo præparata, P. L. 1745. Ferri rubigo, P. L. 1787. Ferri subcarbonas, P. L. 1829.

ounces; boiling water, *half a pint;* cold water, *three pints and a half.* Dissolve the sulphate in the boiling water, add the cold water, and then the carbonate of soda, previously dissolved in about thrice its weight of water. Collect the precipitate on a calico-filter; wash it with water till the water is but little affected with solution of nitrate of baryta, and dry it in the hot air press, or over the vapour bath."

FERRI CARBONAS, Dub. *Carbonate of Iron.*

"Take of sulphate of iron, *eight ounces;* crystallized carbonate of soda of commerce, *ten ounces;* distilled water, *two gallons.* Dissolve each salt in one half of the water, and both solutions being raised to the boiling temperature, mix them, and set the whole to rest in a covered vessel for six hours. The supernatant solution having been drawn off with a syphon, the precipitate is to be drained on a calico-filter, and then subjected to strong expression. Finally, let it be dried at a temperature not exceeding 212°, pulverized, and preserved in a well-stopped bottle."

Syn. Carbonate de Fer (*F.*), Kohlensaures Eisen Rost (*G.*), Ossido Carbonato di Ferro (*I.*), Sudud ul hedeed (*Arab.*), Eerumboo Lohayka zung (*Duk.*), Mandura (*Sans.*), Kith (*Hind.*), Zafran ahun (*Pers.*), Tuppoo (*Tam.*).

These preparations were originally intended to be protocarbonates of iron; but even when the sulphate employed is a protosulphate, they contain more sesquioxide of iron than protocarbonate; hence the present name given by the London College. By mixing the solutions together, a double decomposition is effected; the sulphuric acid of the sulphate of iron combines with the soda, while the oxide of iron attracts the disengaged carbonic acid of the carbonate of soda; and hence the products are an insoluble protocarbonate of iron, and a soluble sulphate of soda, which are easily separated by washing and filtration. When first precipitated, the protocarbonate of iron has a whitish colour, and is at a minimum of oxidizement; but, while drying, it attracts oxygen rapidly from the atmosphere, parts with the carbonic acid, and is converted into the sesquioxide. I have found that the precipitate combines with the largest proportion of carbonic acid when the solutions are mixed at a temperature of 150° of Fahrenheit. Filtration is necessary for separating it, the decantation of the clear fluid being very difficult, owing to the lightness of the precipitate. The great solubility of the sulphate of soda renders much subsequent washing unnecessary; and the precipitate, after being washed in distilled tepid water, should be dried in the paper on which it is filtered, by a heat not exceeding 200°.

Qualities. — Precipitated sesquioxide of iron is inodorous, has a slightly styptic taste, and is of a chocolate-brown colour. It is insoluble in water, but acids dissolve it with slight effervescence,

disengaging the small portion of carbonic acid which it contains. It is decomposed by heat, and converted entirely into the peroxide of the metal. In my experiments, ten grains of the dried sesquioxide, prepared with protosulphate of iron, and effloresced carbonate of soda, lost 2·3 grains when dissolved in hydrochloric acid; and the same quantity prepared with the crystallized alkali, and dried with great care, lost 1·4; so that, prepared in the former method it contained 23 per cent. of carbonic acid, and in the latter 14 per cent. Mr. Phillips says, he has found that it contains 15 per cent. when prepared with the greatest care, which indicates its composition to be carbonate of iron 40, sesquioxide of iron 60, in 100 parts[1]; but it rarely contains so much of the carbonate. The composition of the carbonate is 1 eq. protoxide of iron + 1 eq. of carbonic acid, that of the sesquioxide is 1 eq. of iron + 1½ eq. of oxygen.

Medical properties and uses.—This preparation is a useful tonic; it has been prescribed with great advantage in tic douloureux, chorea, and other affections of the nervous system. The dose is from grs. iv. to grs. xxx., given three times a day, combined with myrrh, or aromatics. But in tic douloureux it has been given to the extent of four drachms or more for a dose.

FERRI CARBONAS CUM SACCHARO, Lond. *Carbonate of Iron with Sugar.*

"Take of sulphate of iron, *four ounces;* carbonate of soda, *four ounces and a quarter;* sugar, *two ounces;* boiling distilled water, *four pints.* Dissolve separately the carbonate and sulphate in two pints of water. Mix together the solutions, yet hot, and place aside, that the carbonate of iron may be deposited; then the supernatant fluid, being poured off, wash the precipitated carbonate frequently with water. To this add the sugar, dissolved in two fluid ounces of water, and evaporate the mixture in a water bath until the powder be dried. Keep it in a well-closed vessel."

FERRI CARBONAS SACCHARATUM, Edin. Dub. *Saccharine-carbonate of Iron.*

"Take of sulphate of iron, *four ounces;* carbonate of soda, *five ounces;* pure sugar, *two ounces;* water, *four pints.* Dissolve the sulphate and carbonate each in two pints of the water; add the solutions, and mix them; collect the precipitate on a cloth-filter, and immediately wash it with cold water, squeeze out as much of the water as possible, and, without delay, triturate the pulp which

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[1] *Trans. of the Pharm.* p. 98. 1829.

remains with the sugar previously in fine powder. Dry the mixture at a temperature not much above 120°."

Dublin.

"Take of sulphate of iron, *eight ounces;* crystallized carbonate of soda of commerce, *ten ounces;* distilled water, *two gallons;* refined sugar, in fine powder, *four ounces.* With the sulphate of iron, carbonate of soda, and water, prepare, as directed in the formula for *Ferri Carbonas,* a carbonate of iron, and immediately after it has been expressed, mix with it the refined sugar. Dry the mixture at a temperature not exceeding 212°, and having reduced it to a fine powder, preserve it in a well-stopped bottle."

By the action of the sugar, the carbonate of iron is protected from farther oxidizement: the value of the preparation depends much on the care taken in its preparation to prevent the action of the air upon the precipitate, previous to the addition of the sugar. The use of weak solutions of sugar for the purpose of dissolving the salts, and washing the precipitate, is said to ensure more effectually the protection from oxidation: this method was proposed by M. Valet, of Paris, and is ordered by the United States Pharmacopœia in the preparation of the *Pilulæ Ferri Carbonatis.*[1]

Qualities. — It occurs as a greenish-grey powder, soluble with effervescence in hydrochloric acid; it is composed of carbonate of iron and sugar, with a small and varying amount of the sesquioxide.

Medical properties and uses. — It is a very useful chalybeate and tonic, and is applicable in all cases where proto-salts of iron are indicated. Dose gr. v. to gr. xx.

FERRUGO, Edin. *Sesquioxide* and *Hydrated Sesquioxide of Iron.*

"Take of sulphate of iron, *four ounces;* sulphuric acid (commercial), *three fluid drachms and a half;* nitric acid (d. 1380), *nine fluid drachms;* stronger aqua ammoniæ, *three fluid ounces and a half;* water, *two pints.* Dissolve the sulphate in the water, add the sulphuric acid, and boil the solution; add then the nitric acid in small portions, boiling the liquid for a minute or two after each addition, until it acquires a yellowish-brown colour, and yields a precipitate of the same colour with ammonia. Filter; allow the liquid to cool; and add in a full stream the aqua ammoniæ, stirring the mixture briskly. Collect the precipitate on a calico-filter; wash it with water till the washings cease to precipitate with

[1] *United States Dispensatory.*

nitrate of baryta; squeeze out the water as much as possible; and dry the precipitate at a temperature not exceeding 180°.

"When this preparation is kept as an antidote for poisoning with arsenic, it is preferable to preserve it in the moist state, after being simply squeezed."

FERRI PEROXYDUM HYDRATUM, Dub. *Hydrated Peroxide of Iron.*

"Take of sulphate of iron, *eight ounces;* pure sulphuric acid, *six fluid drachms;* pure nitric acid, *half a fluid ounce;* solution of caustic potash, *one quart;* distilled water, *twelve ounces.* To ten ounces of the water add the sulphuric acid, and in the mixture, with the aid of heat, dissolve the sulphate of iron. Mix the nitric acid with the remainder of the water, and, having added the diluted acid to the solution of sulphate of iron, concentrate by boiling, until, upon the sudden disengagement of much gas, the liquid passes from a dark to a red colour. Let this be now poured into the solution of caustic potash, and, when the mixture has been well stirred, place it on a calico-filter, and let the precipitate be washed with distilled water until the liquid which passes through ceases to give a precipitate when dropped into a solution of chloride of barium. Lastly, enclose the precipitate, while in a pasty state, in a porcelain pot whose lid is made air-tight by a luting of lard, so as to prevent the loss of water by evaporation."

FERRI PEROXYDUM, Dub. *Peroxide of Iron.*

"Take of hydrated peroxide of iron, *any convenient quantity.* Place it in an oven, on a few folds of filtering paper, and, when it has become dry to the touch, transfer it to a covered crucible, and expose it for a few minutes to an obscure red heat."

Syn. Hydrate de Peroxyde de Fer (*F.*), Eisen Oxydhydrat (*G.*), Vodraia okis geleza (*Russ.*).

Medical properties and uses.—This hydrated sesquioxide has been lately extensively employed as an antidote in cases of poisoning by arsenious acid. It certainly has the property of rapidly removing arsenious acid from its solution in water, and forming with it an insoluble arseniate of iron. It was on this account suggested as an antidote for poisoning with arsenious acid or its salts by Messrs. Bunsen and Berthold[1]: and their observations have been confirmed to a considerable extent in this country. Some experiments, by Dr. Maclagan, have demonstrated that twelve parts of the hydrated oxide are required for each part of arsenious acid.[2] But in cases of poisoning the hydrate should be freely administered, and the stomach afterwards emptied by an emetic. It may be also used as a tonic, in doses of from grs. v. to ℈j. The dry peroxide of iron will not serve as an antidote for arsenic; its medicinal action

[1] *Journ de Pharm.* xx. 567.

[2] *Edin. Med. and Surg. Journ.* No. 144.

is probably the same as the red oxide of the Edinburgh, and the sesquioxide and carbonate of the London and Dublin pharmacopœias, which only differ from this preparation in containing a small amount of undecomposed carbonate of iron.

FERRI SULPHAS, Lond. Edin. Dub. *Sulphate of Iron.*[1]

"Take of commercial sulphate of iron, *four pounds;* sulphuric acid, *a fluid ounce;* iron, drawn into wire, *an ounce;* distilled water, *four pints.* Mix the acid with the water, and to these add the sulphate and the iron; then apply heat, frequently stirring, until the sulphate be dissolved; strain the solution while yet hot, and put by, that crystals may form. Evaporate the liquor poured off, that crystals may again form."

Edinburgh.

"If the sulphate of iron of commerce be not in transparent green crystals, without efflorescence, dissolve it in its own weight of boiling water acidulated with a little sulphuric acid; filter; and set the solution aside to crystallize. Preserve the crystals in well-closed bottles."

Dublin.

"Take of iron wire, or turnings of wrought iron, *four ounces;* oil of vitriol of commerce, *four fluid ounces;* distilled water, *one pint and a half.* Pour the water on the iron placed in a porcelain crucible, add the oil of vitriol, and when the disengagement of gas has nearly ceased, boil for ten minutes. Filter now through paper, and, having separated the crystals, which, after the lapse of twenty-four hours, will have been deposited from the solution, let them be dried upon blotting paper placed upon a porous brick, and then preserved in a well-stopped bottle."

Syn. Sulfate de Fer (*F.*), Schwefelsäures Eisen oxydid (*G.*), Zwalvelzuures yzer (*Dutch*), Gron Vitriol (*Swed., Danish*), Sernokislaia Zakis geleza (*Russ.*), Solfato di Protossido di Ferro (*I.*), Vitriolo verde (*S.*), Caparosa verde (*Port.*), Unua Baydie (*Tam.*), Casis (*Hind.*), Heera Cashsih (*Duk.*), Taroosee (*Malay*), Zungarmadenee (*Arab.*), Tootya Subz (*Pers.*).

The Edinburgh College merely orders the commercial salt to be re-crystallized with excess of sulphuric acid, but in addition to this the London College makes use of iron wire to precipitate any copper which may be present in the common sulphate.

In the Dublin process part of the water is decomposed; the iron is oxidized by combining with its oxygen, while its hydrogen is dissipated in the gaseous form; and the oxide thus produced unites with the acid, and forms sulphate of oxide of iron; which is dissolved in the undecomposed portion of the water. Concentrated

[1] Old names of this salt: — *misy, sory, calchantum* (Pliny), *sal martis, sal chalybis, vitriolum ferri, vitriolum martis.*

sulphuric acid, scarcely exerts any action on iron at a low temperature, and water alone is very slowly decomposed by it, so that the rapid decomposition of the diluted acid by the iron must be ascribed to the sum of the affinities of the base of the acid for oxygen, and of the iron for oxygen being superior to that of the oxygen to the hydrogen of the water, which is, therefore, decomposed. The solution is of a pale-green colour, and, when evaporated directly, yields crystals of protosulphate of iron[1]: but if it be exposed for some time to the atmosphere it attracts oxygen, becomes turbid, a sulphate of the peroxide is precipitated, and the salt obtained is a persulphate. If a very pure sulphate is required there should be an excess of sulphuric acid in the solution prepared for crystallization.

Qualities. — Sulphate of iron is inodorous, has a strong styptic taste: it crystallizes in transparent, rhomboidal prisms, of a fine pale blue-green colour, which redden the vegetable blues, are soluble in two parts of water at 60°, and three fourths of their weight of boiling water, and are insoluble in alcohol. It is precipitated nearly white from aqueous solutions by the alkalies, and also by ferrocyanide of potassium, but, on exposure to the air, the former becomes red, owing to the formation of the sesquioxide; the latter becomes blue, being changed to Prussian blue. When exposed to the air, the crystals gradually become opaque, and are covered with a yellowish powder, owing to the attraction of the oxygen of the atmosphere by the salt, during its efflorescence. Exposed to heat, sulphate of iron undergoes the watery fusion, and loses six-sevenths of its water; the crystals lose their form, and fall to powder; and in an increased heat the acid, partly in the state of what is termed Nordhäusen sulphuric acid ($HO, 2\,SO_3$), is driven off, and the base remains in the state of a red oxide, the *colcothar of vitriol* of commerce. This salt contains 1 eq. of iron, 1 eq. of sulphuric acid united with 7 eqs. of water, 6 of which are retained with much less force than the last, which requires a high temperature, above 400° Fahr., for its expulsion. Formula, $Fe\,O, S\,O_3 + HO + 6\,HO$; or, $Fe\,O, SO_3 + 7\,HO$. The following substances decompose sulphate of iron: — the earths, the alkalies and their carbonates, ammonia, lime water, biborate of soda, phosphate of soda, hydrochlorate of baryta, nitrate of silver, acetate of lead, every salt the base of which forms an insoluble compound with

[1] This salt, which is known in commerce by the name of *green vitriol*, is prepared on a great scale from the native sulphurets of iron, by exposing them to the air and moistening them, till a crust of sulphate of iron is formed on their surface, which is afterwards obtained in crystals by solution and evaporation. The Haiz yields annually 985 cwt. A native sulphate is procured in the hills of Behar, and used by the native dyers of Patna. It consists of 39·0 sulphate of iron + 36·0 peroxide of iron + 23 magnesia + 2 water = 100. *Journ. of Asiatic Society*, June 1833.

sulphuric acid, and soaps: hence these are incompatible in formulæ with this salt. Sulphate of iron is also decomposed by all infusions and decoctions of vegetable astringents. It should be preserved in alcohol.

Medical properties and uses. — Sulphate of iron is tonic, emmenagogue, and anthelmintic.[1] It is a useful remedy, when exhibited with due caution, in all cases in which preparations of iron are indicated; but in improper doses it occasions pain of the bowels, nausea, and vomiting, and often proves hurtful by being too long taken. It has been given with advantage in diabetes, in the latter stage of phthisis, and in amenorrhœa depending on a weakened action of the blood-vessels. The dose is from gr. j. to grs. v., combined with ammoniacum, rhubarb, myrrh, or bitter extracts. It has lately been used, dissolved in water, as a lotion to cancerous and phagedenic ulcers.[2] The usual dose is from gr j. to grs. v.

FERRI SULPHAS GRANULATUM, Dub. *Granulated Sulphate of Iron.*

"Take of iron wire, or turnings of wrought iron, *four ounces;* oil of vitriol of commerce, *four fluid ounces;* distilled water, *one pint and a half;* rectified spirit, *ten fluid ounces.* Pour the water on the iron placed in a porcelain capsule; add the oil of vitriol, and, when the disengagement of gas has nearly ceased, boil for ten minutes. Filter now through paper into a vessel containing eight ounces of the spirit, and stir the mixture as it cools, in order that the salt may be obtained in minute granular crystals. Let these, deprived by decantation and draining of the adhering liquid, be washed on a funnel or small percolator with the remainder of the spirit; and, when rendered quite dry by repeated pressure between folds of filtering paper, and subsequent exposure for twenty-four hours beneath a glass bell over a common dinner plate half filled with oil of vitriol, let them be preserved in a well-stopped bottle."

In this process a solution of sulphate of iron is first formed, and then in place of being allowed to crystallize in the ordinary way, it is dropped into rectified spirit and the mixture stirred, by which means the sulphate is precipitated in the granular form, the granules being composed of very minute crystals; the use of the alcohol also deprives the prosulphate of any adhering persalt.

It is used in the preparation of *Ferri Sulphas Siccatum.*

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[1] It was used as an anthelmintic in the time of Pliny, who says, "Sumitur ad depellenda ventris animalia drachmæ pondere cum melle." *Nat. Hist.* lib. xxxiv. cap. 12. It is used by porter brewers, to give a peculiar roughness to the beer.

[2] *Edinburgh Med. and Surg. Journal,* ii. 373.

FERRI SULPHAS EXSICCATUM, Edin. *Dried Sulphate of Iron.*

"Expose *any convenient quantity* of sulphate of iron to a moderate heat in a porcelain or earthenware vessel, not glazed with lead, till it is converted into a greyish-white mass, which is to be reduced to powder."

FERRI SULPHAS SICCATUM, Dub. *Dried Sulphate of Iron.*

"Take of granulated sulphate of iron *any convenient quantity;* expose the salt in a porcelain capsule to an oven heat not exceeding 400°, until aqueous vapours cease to be given off; and, having then reduced it to fine powder, preserve it in a well-stopped bottle."

In these processes the degree of heat should not exceed 400° of Fahrenheit. The salt is merely deprived of six equivalents of its water of crystallization, the seventh equivalent is still retained at that temperature: it contains about four-fifths more of real sulphate than the crystallized salt.

FERRI VALERIANAS, Dub. *Valerianate of Iron.*

"Take of valerianate of soda, *five ounces and three drachms;* sulphate of iron, *four ounces;* distilled water, *one pint.* Let the sulphate of iron be converted into a persulphate, as directed in the formula for *Ferri Peroxydum Hydratum,* and, by the addition of distilled water, let the solution of the persulphate be augmented to the bulk of eight ounces. Dissolve the valerianate of soda in ten ounces of the water; then mix the two solutions cold, and, having placed the precipitate which forms upon a filter, and washed it with the remainder of the water, let it be dried by placing it for some days rolled up in bibulous paper on a porous brick. This preparation should be kept in a well-stopped bottle."

The process consists in the double decomposition of the sulphate of the peroxide of iron and the valerianate of soda.

Qualities. — This salt occurs in the form of a reddish, granular powder, having the strong odour of valerianic acid. It is soluble in spirit, but not in water; decomposed by heat into peroxide of iron and valerianic acid, which is volatilized. It is a valerianate of the peroxide of iron. Tartrates and citrates of iron impregnated with oil of valerian or valerianic acid have been occasionally sold for this salt.

Medical properties and uses. — Employed in cases where both antispasmodics and iron preparations are indicated. Dose gr. j. to grs. ij. or grs. iij.

VINUM FERRI, Lond. *Wine of Iron.*

"Take of iron drawn into wire, *an ounce;* sherry wine, *two pints.* Digest for thirty days, and strain."

Qualities. — This preparation was contained in the Pharmacopœia of 1824, but omitted in 1836; it consists of wine holding in solution some of the *tartrate, malate,* and *acetate* of iron, the quantity of the iron salts depending much on the nature of the wine employed. Mr. Phillips states that 22 grains of sesquioxide of iron are contained in f ℥ xvi. of this preparation. A solution of the ammonio-tartrate of iron in wine is frequently substituted for it.

Medical properties and uses. — A useful and agreeable form for the administration of small amounts of iron, when wine is not contra-indicated. Dose f ʒ j. to f ℥ ss. or more.

PRÆPARATA EX HYDRARGYRO.

PREPARATIONS OF MERCURY.

HYDRARGYRUM PURUM. Dub. *Pure Mercury.*

"Take of quicksilver of commerce, *three pounds;* pure muriatic acid, *half a fluid ounce;* distilled water, *two ounces.* Having introduced the quicksilver into a small glass retort, over the body of which a hood of sheet iron is supported, let the heat of a gas lamp be applied until two-thirds of the metal has distilled over. Boil this for a few minutes with the acid and water, and having, by repeated affusion of distilled water, and decantation, removed the entire of the acid, let the metal be poured into a capsule, and dried by the application of heat."

By this operation the mercury, that found in commerce being sometimes impure, is rendered fit for medicinal use; the distillation separates the mercury from any non-volatile metals, and by digestion with the dilute acid, any readily oxidizable volatile metal will be dissolved and removed.

HYDRARGYRUM CUM CRETA, Lond. Edin. Dub. *Mercury with Chalk.*[1]

"Take of mercury, *three ounces;* prepared chalk, *five ounces.* Rub them together until globules are no longer visible."

The directions of the Edinburgh College are the same as the London.

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[1] Mercurius alkalizatus, P. L. 1745.

Dublin.

"Take of pure mercury, *one ounce;* prepared chalk, *two ounces.* Rub the mercury and chalk in a porcelain mortar until the metallic globules cease to be visible, and the mixture acquires a uniform grey colour."

In these processes the mercury is probably partly oxidized during the trituration. Mr. Phillips says, that he knows from good authority that a little water greatly facilitates the process.

Medical properties and uses. — It is alterative, and is prescribed in mesenteric affections, in typhus fever, in pneumonia and pleurisy, in porrigo, and other eruptions where a mild mercurial is required. It merits attention as an alterative for children. The dose may be from grs. v. to ʒ ss., given twice a day, mixed in any viscid substance.

HYDRARGYRUM CUM MAGNESIA, Dub. *Mercury with Magnesia.*

"Take of pure mercury, *one ounce;* carbonate of magnesia, *two ounces.* The method of preparation is the same as for Hydrargyrum cum Creta."

Medical properties and uses. — This preparation is similar to the one above described in its action, but more aperient, from the magnesia contained in it. It is well adapted to the diseases of children. Dose gr. v. to ℈ j.

HYDRARGYRI NITRICO-OXYDUM, Lond.[1] *Nitric Oxide of Mercury.*

"Take of mercury, *three pounds;* nitric acid, *eighteen fluid ounces;* distilled water, *two pints.* Mix, and apply a moderate heat until the mercury be dissolved. Boil down the liquor, and rub the residue into powder. Put it into another very shallow vessel, and expose it to a gentle heat, gradually raised until red vapours cease to arise."

HYDRARGYRI OXYDUM RUBRUM, Edin. Dub. *Red Oxide of Mercury.*

"Take of mercury, *eight ounces;* diluted nitric acid (D. 1280), *five fluid ounces.* Dissolve half of the mercury in the acid with the

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[1] Hydrargyrus nitratus ruber, P. L. 1787.

aid of a moderate heat; and continue the heat till a dry salt is formed. Triturate the rest of the mercury with the salt till a fine uniform powder be obtained; heat the powder in a porcelain vessel, and constantly stir it till acid fumes cease to be discharged."

Dublin.

"Take of pure mercury, *eight ounces;* pure nitric acid, *three fluid ounces;* distilled water, *six ounces.* In the acid, diluted with the water, digest the mercury, using at first a very gentle heat, but, when the action has ceased, finally boiling for a few minutes; and, having decanted the solution, evaporate to dryness. Let the residuum, first reduced to powder, be transferred to a shallow cast-iron pot with a flat bottom, and loosely covered by a fire-tile; and in this let it be exposed to the heat of a slow fire until red vapours cease to be given off. The heat must now be withdrawn, and, when the pot has cooled, its contents should be transferred to bottles."

Syn. Oxyde Mercure rouge par l'Acide nitrique (*F.*), Röther Präcipitatat (*G.*), Mercurio precipitato rosso (*I.*), Krasnaia trutnaia okis (*Russ.*).

In these processes the mercury is first oxidized at the expense of part of the acid employed; and the oxide, which is in a high state of oxidizement, combines with the undecomposed acid, so as to form a nitrate of mercury. By augmenting the heat this nitrate is decomposed, and the oxide is left of a bright red colour, often combined with a small portion of undecomposed nitrate. However simple the process may appear to be, yet it has been always found difficult to produce the bright red scaly appearance, which the product should have when it is properly prepared. Much of the success depends on the purity of the acid; the proper regulation of the heat, which, at the utmost, should not be 600°[1]; and the scale on which it is formed, the heat being more steadily maintained, and acting with more uniformity on a large than on a small quantity of materials. On this account, the red precipitate prepared in Holland has always been considered better than any prepared in this country. The proportions used by the Dutch chemists are fifty pounds of pure mercury, and seventy of pure nitric acid of a specific gravity 1·3. The decomposition is conducted in very large flat vessels, the fire being raised when the gaseous nitrous fumes cease to be sensibly disengaged; and the test of its perfection is the inflammation of a match which has been just blown out, by introducing it into the vapour arising from the decomposing oxide.[2]

Qualities. — When properly prepared, this is a binoxide mixed

[1] Higgins, *Essays*, i. 133.

[2] M. Payssé, *Annales de Chimie*, li. 202.

with a mere trace of nitrate of mercury. It is in small scales of a bright red colour, very acrid and corrosive; nearly insoluble in water, but totally soluble in nitric acid without effervescence. It is completely volatilized in a red heat, and at the same time decomposed. We have found the observation of Dr. Murray correct, that "if the preparation be boiled for a short time with five or six times its weight of water, the liquor, when filtered, has a styptic, metallic taste, and gives a white precipitate with water of ammonia or carbonate of potassa; a plain proof that it holds dissolved nitrate of mercury." It is a binoxide of mercury, containing 1 equivalent of mercury + 2 equivalents of oxygen. Its formula is $Hg. O_2$. It is sometimes adulterated with red oxide of lead, which may be detected by acting upon one part of the suspected oxide by four parts of acetic acid: if the oxide of lead be present, the solution has a sweetish taste; or when the oxide is subjected to the flame of a spirit-lamp on a piece of charcoal, if lead be present, a button of that metal is procured; whilst in the pure state the oxide is perfectly volatilized. When the adulteration is brickdust, nitric acid will leave it after dissolving the oxide. According to the London College this oxide is characterized by occurring in "red shining scales, subliming at an intense heat, giving out no nitrous vapours, and soluble in hydrochloric and nitric acids."

Medical properties and uses. — Nitric oxide of mercury is stimulant. It is an external application only, being used, when rubbed into a fine powder, as a stimulant to old sores, and exuberant or fungous growths. As a powder, in the proportion of gr. ss. to grs. iv. of sugar, it is blown into the eye to remove specks on the cornea; and formed into an ointment with lard, it is a useful application to ulcerations of the eyelids, and to chancres.

Officinal preparations. — *Unguentum Hydrargyri Nitrico-oxidi*, L. *Unguentum Oxidi Hydrargyri*, E. *Unguent. Hydrarg. Oxidi Rubri*, D.

HYDRARGYRI SULPHAS, Dub. *Sulphate of Mercury*, or sometimes called a Bipersulpate.

"Take of quicksilver of commerce, *ten ounces;* oil of vitriol of commerce, *six fluid ounces.* Place the quicksilver and oil of vitriol in a porcelain capsule, and apply heat until effervescence ceases, and nothing remains but a white dry crystalline salt."

In this process part of the acid is decomposed, its oxygen combines with the mercury, forming it into a binoxide, which in its turn unites with another portion of the sulphuric acid, and forms a bipersulphate. It is white, in fine crystalline plates, or in prismatic needles; is soluble in 500 parts of cold, and 250 of boiling water. It consists of 1 eq. of binoxide of mercury + 2 eq. of sulphuric acid. Formula $Hg\ O_2, 2\ S\ O_3$. When thrown into hot water, it is decomposed, and a yellow subsalt is formed, *Turpeth*

Mineral, which was formerly used as an errhine. The only use of the sulphate is for making the bichloride of mercury.

HYDRARGYRI AMMONIO-CHLORIDUM[1], Lond. Dub. *Ammonio-chloride of Mercury, or White Precipitate of Mercury.*

"Take of bichloride of mercury, *six ounces;* distilled water, *six pints;* solution of ammonia, *eight fluid ounces.* Dissolve the bichloride of mercury in the water, aided by heat; and add to this, when cold, the solution of ammonia, frequently stirring. Wash the precipitated powder until it become tasteless, and then dry it."

Dublin.

"Take of corrosive sublimate, *one ounce;* solution of ammonia, *nine fluid drachms;* distilled water, *one pint.* Dissolve the corrosive sublimate in the water, with the aid of a gentle heat; pour the ammonia into the solution, and, having stirred the mixture well, collect the precipitate on a filter, and wash it with warm distilled water until the liquid which passes through ceases to give a precipitate when dropped into an acid solution of nitrate of silver. Lastly, dry the product at a temperature not exceeding 112°."

HYDRARGYRI PRECIPITATUM ALBUM, Edin. *White Precipitated Mercury.*

"Take of corrosive sublimate, *six ounces;* distilled water, *six pints;* aqua ammoniæ, *eight fluid ounces.* Dissolve the corrosive sublimate with the aid of heat in the distilled water, and when the solution is cold add the aqua ammoniæ; stir the whole well; collect the powder on a calico filter, and wash it thoroughly with cold water."

Syn. Muriate de Mercure precipité (*F.*), Salsaures Quecksilber prezipitat (*G.*), Precipitato bianco di Mercurio (*I.*).

Qualities. — This ammonio-chloride of mercury is inodorous and insipid; of a snowy whiteness, smooth, insoluble in water, and does not become black when triturated with lime-water. It is dissolved by sulphuric, nitric, and hydrochloric acids; the latter of which restores it to the state of soluble bichloride, the *sal alembroth* of the old chemists. If heated with potassa, it is decomposed, and its ammonia expelled, owing to the combination of the chlorine with the potassium. It is sometimes adulterated with white lead; to discover which, digest one part of it in four parts of acetic acid, and add to the solution a small quantity of sulphuret of ammonia: a

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[1] Mercurius præcipitatus albus, P. L. 1745. Calyx hydrargyri alba, P. L. 1787 Hydrargyrum præcipitatum album, P. L. 1824.

black precipitate, insoluble in sulphuric acid, indicates the presence of lead. Chalk and starch are also sometimes mixed with it; and may be detected by heating the preparation in an iron spoon: if pure, it is completely volatilized; but if adulterated with starch, a black coal is left; or if with chalk, a white powder at the bottom of the spoon. It is said, by Mr. Hennell, to be a compound of 1 eq. of binoxide of mercury, and 1 of hydrochlorate of ammonia. According to Mr. Phillips, its composition is 1 eq. of binoxide of mercury + 1 eq. of bichloride of mercury + 2 eq. of ammonia. The salt precipitated from a persalt of mercury, by means of ammonia, is now generally regarded as an amide, or a compound containing the hypothetical radical amidogen (NH_2): and Dr. Kane considers the white precipitate as a double salt, of a binamide and bichloride of mercury. Formula $Hg(NH_2)_2 + HgCl_2$. The salt, viewed according to the different views of Hennell, Phillips and Kane, must be regarded as containing different amounts of water.

Medical properties and uses. — This preparation is only used in combination with lard, as an ointment for the cure of itch, and some other cutaneous eruptions.

Officinal preparations. — *Unguentum Hydrargyri Ammonio-chloridi*, L. *Ung. Hydrargyri præcipitati Albi*, E.

HYDRARGYRI CHLORIDUM[1], Lond. *Chloride of Mercury.*

"Take of mercury, *four pounds;* sulphuric acid, *twenty-one fluid ounces and a half;* chloride of sodium, *one pound and a half.* Boil two pounds of the mercury with the sulphuric acid in a proper vessel, until the bipersulphate of mercury is dry; when this is cold triturate it with two pounds of mercury in an earthen mortar, that they may be perfectly mixed. Then add the chloride of sodium, and rub them together until all globules disappear; afterwards sublime. Reduce the sublimed matter to a very fine powder, and wash it carefully with boiling distilled water, and dry it."

CALOMELAS, Edin. Dub. *Calomel.*

"Take of mercury, *eight ounces;* sulphuric acid, *two fluid ounces and three fluid drachms;* pure nitric acid, *half a fluid ounce;* muriate of soda, *three ounces.* Mix the acids, add four ounces of the mercury, and dissolve with the aid of a moderate heat. Bruise it so as to obtain a dry salt; add the rest of the mercury and the muriate of soda; and triturate until the globules entirely disappear. Heat the mixture by means of sand-bath in a proper subliming

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[1] Old names, *Aquila alba, Aquila mitigata, Manna metallorum, Panchymagogum minerale, Panchymagogus quercetanus, Sublimatum dulce, Mercurius dulcis sublimatus, calomelas. Hydrargyri submurias*, P. L. 1824. Of these, adding *Hydrargyri Chloridum, Calomelas* is the best, inasmuch as it is most generally used, and is not likely to be confounded with *Hydrargyri bichloridum.*

apparatus. Reduce the sublimate to fine powder, and wash it well with boiling distilled water until the water ceases to precipitate with solution of iodide of potassium, and then dry it."

Dublin.

"Take of sulphate of mercury, *ten pounds;* mercury of commerce, *seven pounds;* dried chloride of sodium, *five pounds.* Incorporate as completely as possible the sulphate and the metallic mercury by prolonged trituration, and having then added the chloride of sodium, previously reduced to a fine powder, rub all well together until a perfectly equable mixture is obtained. Heat this, through the medium of sand in a shallow iron pot with a flat bottom, lined with clay, and covered with a lid of cast iron, until the sublimate which attaches itself to a circular plug in the centre of the lid (which admits of being removed and cleaned from time to time) neither exhibits minute globules of mercury, nor is rendered yellow by being touched with a solution of caustic potash. The whole being now permitted to cool down to the temperature of the air, the contents of the pot are to be transferred to a small hot hearth, or oven, whose door is made tight by a clay lute, and a regulated heat is to be applied so as to cause the vaporized calomel to pass into an adjacent chamber of considerable size, on the floor of which it will accumulate in the form of a fine white powder."

Syn. Muriate de Mercure doux; Protochlorure de Mercure (*F.*), Mildes Salzsaures Quecksilber (*G.*), Odno chloristaiartut; Kalomel (*Russ.*), Mercurio dolce sublimato (*I.*).

This very important preparation is a protochloride of mercury. The mercury is first formed into a bipersulphate, which being mixed with a quantity of mercury, equal to that contained in the salt, is changed into a protosulphate. Now, when this is submitted to heat in conjunction with the common salt, a double decomposition takes place; the chlorine of the sodium unites with the mercury in equal equivalents, and forms the chloride, whilst the oxygen of the protoxide in the protosulphate oxidizes the sodium, forming soda, which combines with the sulphuric acid and forms sulphate of soda. The sublimation renders the combination of the mercury with the chloride, and its reduction to the state of a protochloride, complete. In the preparation of calomel much depends on the size of the subliming vessels, and the temperature employed in the sublimation. By the process adopted at Apothecaries' Hall, 50 lbs. of mercury are converted into a sulphate, and when dry triturated with $40\frac{1}{2}$ lbs. of mercury, until the globules disappear, and 34 lbs. of common salt are lastly rubbed up with the mixture, and the whole is then sublimed. About 100 lbs. of calomel are thus

procured. It must be remembered that the salt called the sulphate of mercury in the Dublin Pharmacopœia is the same as the one called the bipersulphate in the London, as the equivalent of mercury is considered by the Dublin College to be half that taken by the London College.

Qualities. — Chloride of mercury or calomel occurs either as a whitish powder, or in the form of a brilliant white semitransparent crystalline mass, the specific gravity of which is 7·175. The crystals are quadrilateral, terminated by four-sided converging planes. It is inodorous, insipid, and when pulverised has a light yellowish or ivory colour, which deepens by long exposure to the light, owing, perhaps, to a partial decomposition. It is regarded as insoluble, one part requiring 1152 parts of water at 212° for its solution.[1] Nitric acid converts it into the bichloride, much nitrous gas being evolved; and the same change is effected by *chlorine,* and the chlorides of sodium and potassium.[2] Lime-water and the alkalies, when triturated with it, instantly render it black, a circumstance which supplies us with a test of its purity; for if it contain any bichloride, an orange-yellow tint is mingled with the black on the addition of lime-water: but in applying this test it is necessary to throw a large quantity of the lime-water at once upon the calomel; for when it is added drop by drop a greenish colour is produced, which might lead to the suspicion of the presence of the bichloride when that is not the case. The water in which it is boiled should, when cold, afford no precipitate with lime-water, nor solution of sulphuretted hydrogen, nor of nitrate of silver, nor iodide of potassium. It is also decomposed by salts of antimony, iron, lead, and copper, and by soap. According to M. Mialhe it is converted into the bichloride when added to solutions of hydrochlorate of ammonia, and the chlorides of sodium or potassium; and partly by the salts in the intestinal canal, on which account it causes salivation.[3] Calomel consists of single equivalents of mercury and chlorine. Formula Hg Cl. Or if a chemical notation were employed by the Dublin College it would be called the subchloride of mercury.

Calomel sometimes contains traces of the bichloride: this is detected by agitating it with ether; if no residue is left after the evaporation of the ether, it is free from bichloride; but if any residue be procured it should be dissolved, and the solution precipitated with liquor potassæ: a yellow precipitate demonstrates the presence of the bichloride. Pure calomel is completely vaporizable by heat. The London College gives the following as the characters of this preparation: —

"Pulverulent, whitish, subliming with heat, becomes black on the addition of potash, and heat being then applied it runs into

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[1] Rouelle. [2] *Journ. de Pharm.* Feb. 1840. [3] *Id.*

globules of mercury; to the water in which it has been washed or boiled, neither nitrate of silver, lime-water, nor hydrosulphuric acid throw down anything."

Medical properties and uses. — This is the most useful of the preparations of mercury, and is more generally employed than almost any other remedy in the whole range of the materia medica.[1] It is antisyphilitic, antispasmodic, alterative, deobstruent, purgative, and errhine. As a remedy in syphilis, it can be fully confided in, when its disposition to run off by the bowels is counteracted by opium. From M. Mialhe's experiments, it excites salivation readily in those who eat much salt, owing to its conversion into the bichloride by the chloride of sodium contained in the bowels. In the same state of combination with opium it is also found efficacious in several convulsive affections, as epilepsy, trismus, and tetanus; and in that species of spasmodic stricture which occurs in virulent gonorrhœa. As an alterative and deobstruent, it is employed with advantage in cutaneous eruptions, as lepra and scabies, in which cases it is combined with antimonials and guaiacum; and in hepatitis, and glandular obstructions. In dropsies it assists the action of elaterium, squill, and foxglove; and as a purgative it may be employed with safety in almost every form of disease not attended with visceral inflammation, or where there is not great irritability and delicacy of habit. Calomel does not act with certainty as a purgative, even in large doses; and, therefore, it is generally combined with scammony, jalap, or some other active cathartic. The usual dose, to affect the habit, and produce ptyalism, is from gr. j. to grs. ij., in a pill, with opium, given night and morning; and from grs. iij. to grs. viij. act in general as a purgative: but in some complaints, as yellow fever, hydrocephalus, and croup, for example, in which it is supposed to exert a specific effect, this dose has been repeated every two or three hours, until upwards of 100 grains have been taken in a very short space of time.[2]

On account of its insolubility and great specific gravity it can be given only in the form of pills and powders.

Officinal preparations. — *Pilula Hydrargyri Chloridi composita*, L. *Pilulæ Calomelanos compositæ*, E. D. *Pilulæ Calomelanos et Opii*, E.

HYDRARGYRI BICHLORIDUM, Lond. *Bichloride of Mercury.*

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[1] It was described, in 1608, by Beguin, who calls it *draco mitigatus*, corrosive sublimate being called by the alchymists *draco*, the dragon; but from Mr. Hatchett's experiments on the calomel of Thibet, it would appear that it has been much longer known to the natives of that part of India. — *Brande's Manual*, p. 302.

[2] Doses of calomel were formerly given which appear almost incredible to the modern physician. Thus Michaelis Alberti informs us, that Helwichius gave ℈v. for a dose to two patients, and to a third 72 grains, which affected the mouth for a fortnight. Neuterus gave at first gr. xv.; second dose, ℈j.; third ʒss.; fourth ʒj., which he continued till ptyalism was excited. — *Halleri Dissert.* vol. vii.

"Take of mercury, *two pounds;* sulphuric acid, *twenty-one fluid ounces and a half;* chloride of sodium, *one pound and a half.* Boil the mercury with the sulphuric acid in a proper vessel, until the bipersulphate of mercury become dry: rub this, when it is cold, with the chloride of sodium in an earthenware mortar; then gradually raise the heat, and sublime."

SUBLIMATUS CORROSIVUS, Edin. *Corrosive Sublimate.*

"Take of (commercial) mercury, *four ounces;* sulphuric acid, *two fluid ounces and three fluid drachms;* pure nitric acid, *half a fluid drachm;* muriate of soda, *three ounces.* Mix the acids; add the mercury; dissolve it with the aid of a moderate heat, and then raise the heat so as to obtain a dry salt. Triturate this thoroughly with the muriate of soda, and sublime in a proper apparatus."

SUBLIMATUM CORROSIVUM, Dub. *Corrosive Sublimate.*

"Take of sulphate of mercury, *ten pounds;* dried chloride of sodium, *five pounds.* Reduce each salt to a fine powder, and, having mixed them carefully by trituration in a mortar, let the mixture be introduced into an iron pot lined with clay, and by a regulated heat, applied through the intervention of sand, let the corrosive sublimate be sublimed into an earthen head placed over the pot, and connected to it by means of lute. The product should be preserved in an opaque bottle."

Syn. Muriate de Mercure corrosif; Deutochlorure de Mercure (*F.*), Aatzender sublimat; Doppelt-chloric Quecksilber (*G.*), Mercurio sublimato corrosivo; Deutochloruro di Mercurio (*I.*), Druchloristaia rtut. (*Russ.*).

Sulphuric acid does not act upon mercury at a low temperature: but when three parts of this acid are boiled upon two of mercury, with the addition of a small portion of nitric acid, or even without this addition, the metal decomposes the acids and is oxidized, sulphurous gas being emitted with effervescence; and there remains a dry mass of a fine white colour, which is a bipersulphate of the oxide of mercury, or sulphate according to the Dublin College. By triturating this salt with dried chloride of sodium, and exposing the mixture to heat, a double decomposition is effected. According to the present generally received doctrines, the chlorine of the common salt leaves the sodium, and, uniting with the mercury of the bipersulphate, forms a *bichloride* of mercury, which sublimes; while the oxygen of the oxide of mercury combining with the sodium converts it into soda, which, uniting with the sulphuric acid and forming sulphate of soda, remains in the bottom of the cucurbit. This process was first proposed by Kunkel, but no salt has been prepared by a greater variety of methods; and as it is now generally manufactured on the large scale, the proportions of the ingredients ordered by the colleges are perhaps but seldom

used. The corrosive sublimate would be named the chloride of mercury by the Dublin College, if a chemical nomenclature were, in this case, employed; the equivalent of mercury being halved. Sixteen ounces of mercury should yield about ℥xx. of corrosive sublimate. A simple process is the direct solution of the red oxide of mercury in hydrochloric acid, by which the salt is obtained by spontaneous crystallization[1]; but it is too expensive for general purposes. The simplest and the best method is to bring together the two elements, namely, the mercury and the chlorine, and promote the combination of the former with the latter. The union instantly takes place, and the bichloride is formed in beautiful starry flakes.[2]

Qualities. — Bichloride, corrosive muriate, of mercury[3], is obtained by the above process in the form of a white, shining, semi-transparent, easily-pulverized mass, made up of small, acicular crystals. When the process is very carefully and slowly conducted, the crystals, when separately obtained, are regular tetrahedrons, compressed and pointed. On exposure to the air the mass effloresces on the surface. Its specific gravity is 5·2. It is inodorous, and has a very acrid, disagreeable, metallic taste, and gives an alkaline reaction: water at 60° dissolves one twentieth of of its weight, at 212° one third; alcohol at 60° four parts. It is soluble also in ether, sulphuric, nitric, and hydrochloric acids, and may be again obtained unaltered by evaporating the solutions. The fixed alkalies and alkaline earths decompose it, precipitating it from its solution of an orange-yellow colour, or a brick-red, according as the alkali is pure or a carbonate. It is also partially decomposed by exposure to light, and by some metals, and changed into calomel.[4] The carbonates of the fixed alkalies precipitate it of a brick-yellow hue, and ammonia forms with it a white, insoluble compound, the ammonio-chloride of mercury. When triturated with olive oil, the oil is whitened; and when boiled with it, a small portion of calomel is thrown down; and the same is the case when it is boiled with sugar. The volatile oils reduce it. It is also decomposed by solutions of tartrate of potassa and antimony, nitrate of silver and acetate of lead; and forms precipitates

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[1] *Annales de Chimie*, xxviii. 12.

[2] I obtained a patent for preparing it in the large way by this process.

[3] The old names were *Hydrargyrus Muriatus*, *Mercurius sublimatus corrosivus*, *Hydrargyri oxymurias*, P. L. 1824. Of these names the least objectionable is Mercurius sublimatus corrosivus, because the preparation has been known as corrosive sublimate for more than a century; and the other two have given place to H. Bichloridum, to which the best objection is, that the difference from H. Chloridum is too small to insure safety in compounding prescriptions.

[4] Mr. Chenevix found, "that if a bit of copper be put into a solution of corrosive sublimate a white powder shortly falls to the bottom; and that powder is calomel. When washed, it does not contain an atom of copper, nor of corrosive sublimate."

in infusions and decoctions of the following vegetable substances: — chamomile flowers, horse-radish root, columba root, catechu, cinchona bark, rhubarb root, senna, simaruba bark, oak bark, tea; consequently it is incompatible in extemporaneous formulæ with these substances. Animal fluids decompose it more promptly than vegetable. This salt consists of two equivalents of chlorine united with one equivalent of mercury. Formula $Hg\,Cl_2$.

The purity of the salt is readily ascertained by its complete solubility in ether, and its complete volatility when exposed to heat.

Medical properties and uses. — This salt has been long known to chemists.[1] It is a powerful stimulant and alterative; and in large doses is one of the most violent of the metallic poisons. As an antisyphilitic it was early much extolled, and is the active ingredient of many a celebrated empirical nostrum; but modern practice has fixed its real merits much lower than they were formerly placed. When taken in overdoses, either by mistake or designedly as a poison, the best antidote is white of egg *diluted* with water, and given in large, frequently-repeated doses. The albumen was supposed to decompose the bichloride, and reduce it to the state of the chloride, but it is now stated to be a compound of 6·45 of the bichloride undecomposed with 93·55 of the albumen; a compound which exerts little or no deleterious influence on the stomach. M. Taddei has found that gluten and rye-meal are equally serviceable as antidotes to this poison. He ascertained that gr. j. of the bichloride is neutralised by 13 grains of dried gluten, and by 500 to 600 grains of rye-meal.[2] The presence of bichloride of mercury in any solution suspected to contain it may be detected by acidulating the fluid with nitric acid, and putting into it a sovereign, with a piece of clean polished copper wire wound around it; if the poison be present, the gold will be covered with a white coating, which acquires a metallic lustre when rubbed. Another very ingenious galvanic mode of detecting it is a modification of one proposed by Mr. Sylvester. He recommended to bend a piece of iron wire, three inches long, into this shape ⊓, and tie the two ends to a common gold wedding-ring; on a plate of glass, placed horizontally, drop some sulphuric acid, diluted with six parts by weight of water, till it spread the size of a halfpenny; and then, at a little distance, some of the solution supposed to contain the sublimate, till the two edges of the liquids join, and place the wire and the ring in such a manner that the wire may touch the acid and the ring the solution. If any sublimate be present, the ring

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[1] The preparation is said to have been long known to the Chinese, and it is mentioned by Rhazis and Avicenna. *Bergman*, iv. 281.

[2] *Giornale di Fisica et Isis*, 4. 1. 1823, p. 419.

will in a few minutes be coated with mercury, where it touches the solution. The modified test is simply to drop a little of the suspected solution on a gold watch held in one hand, and to touch it with a key or the point of a penknife, held in the other; a galvanic circle is thus formed; the solution is decomposed, and forms an amalgam of mercury and gold on the spot if bichloride of mercury be present.

Bichloride of mercury sometimes succeeds in curing the primary symptoms of syphilis; but it as often fails: it checks the progress of the secondary symptoms, relieving venereal pains, and healing ulcers of the throat; "yet even in those cases," says Mr. Pearson, "it never confers permanent benefit; for new symptoms will appear during the use of it; and on many occasions it will fail of affording the least advantage to the patient from first to last."[1] I have found it most useful when dissolved in nitric acid, which upholds the powers of the habit, while the bichloride is acting as an alterative. It is given with advantage in some other affections, such as old ulcers, chronic rheumatism, and lepra; in which Willan justly affirms that it is the only useful preparation of mercury, "its operation being promoted by giving at the same time an antimonial[2];" and the decoction of dulcamara. Its sensible operation is by urine; but sometimes it occasions the most violent nausea, griping, and purging; in which cases it should be combined with opium; and it is always necessary to take, during its use, some mucilaginous fluid, to moderate the irritation it is apt to induce. It is also used as an external application; in which case the best vehicle is the bitter almond emulsion; and it has the property of preventing this emulsion from fermenting. The dose is from one eighth of a grain to one fourth, twice a day, made into a pill with crumb of bread or extract of poppies. The dose is best divided by adding an equal weight of hydrochlorate of ammonia.

Officinal preparation. — *Liquor Hydrargyri Bichloridi*, L.

LIQUOR HYDRARGYRI BICHLORIDI, Lond. *Solution of Bichloride of Mercury.*

"Take of bichloride of mercury, hydrochlorate of ammonia, each, *ten grains;* distilled water, *a pint.* Dissolve."

This solution is intended to facilitate the administration of minute doses of bichloride of mercury, each fluid ounce of the solution containing half a grain of the salt. It ought not to be long kept nor exposed to a clear light, as the bichloride is gradually decomposed, and calomel precipitated. It is, however, the most safe and convenient form of administering this active salt;

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[1] *Pearson on Remedies for Lues Venerea, &c.* 116.
[2] *Willan on Cutaneous Diseases,* 140.

and it may be given as an antisyphilitic in doses of from f ʒ ss. to ʒ ij. in f ℥ ij. of linseed infusion, or of water and syrup, and in more minute doses when its alterative effects only are required. As a local application, the above solution, diluted with two parts of water, forms a useful gargle in venereal sore throat; and without dilution we have found it serviceable as a gargle for breaking the abscess in cynanche tonsillaris, when suppuration takes place. Diluted with an equal quantity of water, it is employed as a wash against tetters and scabies; and very largely diluted, it may be used as an injection in gonorrhœa; and given in the form of enema, when the stomach will not receive it. With lime-water, in the proportion of gr. j. of the salt to f ℥ j. of lime-water, it forms the yellow wash. When it is over-dosed, the best antidote is white of egg and milk, followed by decoction of galls, or solution of catechu.

HYDRARGYRI IODIDUM, Lond. *Iodide of Mercury.*

"Take of mercury, *an ounce;* iodine, *five drachms;* rectified spirit, *as much as may be sufficient.* Rub together the mercury and the iodine, adding gradually the spirit, until no more globules are visible. Dry immediately the powder in a gentle heat, excluded from the light, and preserve it in a well-stopped black glass vessel."[1]

HYDRARGYRI IODIDUM VIRIDE, Dub. *Green Iodide of Mercury.*

"Take of pure mercury, *one ounce;* pure iodine, *five drachms;* rectified spirit, *a sufficient quantity.* Rub the mercury and iodine in a porcelain mortar, occasionally adding a few drops of the spirit, until metallic globules are no longer visible, and the whole assumes a yellowish green colour. Dry the residue at a temperature not exceeding 212°, and preserve it in a close bottle."

Syn. Proiodid de Mercure (*F.*), Quecksilber Iodure (*G.*), Protoioduro di Mercurio (*I.*).

An immediate union takes place between the mercury and the iodine, and a greenish yellow powder is formed, which sublimes by heat undecomposed, in the form of red scales, that acquire an orange-yellow colour in cooling. It is insoluble in water, and only partially so in alcohol; but it is sparingly soluble in solution of iodide of potassium; and, also, in ether. Light decomposes and blackens it; but it is less liable to decomposition when it has been sublimed. It is a compound of 1 eq. of iodine + 1

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[1] This preparation is readily formed by rubbing together chloride of mercury (calomel) to iodide of potassium, aided by water, or still better by precipitating a solution of iodide of potassium with protonitrate of mercury.

eq. of mercury, or of 55·5 of iodine + 44·5 of mercury in 100 parts. Formula Hg I.

Medical properties and uses.—This iodide possesses alterative and stimulant properties, similar to those of the other mercurial salts. It was first introduced as a therapeutical agent in scrofula, and for the cure of syphilitic ulcers in those of scrofulous habits. According to Dr. Cogswell it is a powerful irritant poison. The dose is from ½ a grain in pills, gradually increased to 1 or 2 grains, or more.

Officinal preparation.—*Unguentum Hydrargyri Iodidi*, L.

HYDRARGYRI BINIODIDUM, Edin. *Biniodide of Mercury.*

"Take of mercury, *two ounces;* iodine, *two ounces and a half;* concentrated solution of muriate of soda, *a gallon.* Triturate the mercury and iodine together, adding occasionally a little rectified spirit, till a uniform red powder be obtained. Reduce the product to fine powder, and dissolve it in the solution of muriate of soda with the aid of brisk ebullition. Filter, if necessary, through calico, keeping the funnel hot; wash and dry the crystals which form on cooling."

HYDRARGYRI IODIDUM RUBRUM, Dub. *Red Iodide of Mercury.*

"Take of corrosive sublimate, *one ounce;* iodide of potassium, *ten drachms;* distilled water, *two pints,* or *as much as is sufficient.* Dissolve the corrosive sublimate with the aid of heat in twenty-five ounces, and the iodide of potassium in five ounces, of the water, and, when both solutions are cold, mix them. Decant the supernatant liquor, when the precipitate has subsided, and, having collected this latter upon a paper filter, wash it with the remainder of the water. Finally, dry the product at a temperature not exceeding 212°, and preserve it in a close bottle."

Syn. Deuto-iodure de Mercure (*F.*), Doppelt Iodiquecksilber (*G.*), Deuto-ioduro di Mercurio (*I.*), Druch iodistaia rtut (*Russ.*).

In the Edinburgh process the spirit is necessary to prevent fulmination, likely to result from the great heat which is evolved. If the materials be pure, and a degree of moisture be preserved by the spirit during the trituration, a pure biniodide is procured. By boiling it in the solution of salt, the biniodide is taken up, and any iodide present is left behind.

In the Dublin process, double decomposition takes place with the formation of biniodide or red iodide of mercury, and chloride of potassium.

The preparation has a beautiful scarlet colour, and sublimes in rhombic scales of a yellow colour, which as they cool again assume a brilliant scarlet hue. They are insoluble in water, but soluble in alcohol, iodide of potassium, solution of bichloride of mercury, common salt, and in some acids. When dissolved in a hot solution of pernitrate of mercury it crystallizes out, on cooling, in beautiful red scales. It is a compound of 1 eq. of mercury + 2 eq. of iodine. Formula $Hg\ I_2$. Its purity is best determined by its complete solubility in salt brine.

Medical properties and uses. — This iodide possesses powerful alternative properties, and may be administered in the same cases as the protiodide. I have found it most beneficial in cases of secondary syphilis, and of lepra, administered at the same time as the iodide of potassium. The dose is gr. $\frac{1}{12}$ to gr. $\frac{1}{4}$, in pills made up with crumb of bread. An ointment, prepared with grs. x. of the biniodide and ℥ j. of lard, is useful in ulcers, similar to those in which the ointment of the binoxide of mercury is recommended.

HYDRARGYRI PERNITRATIS LIQUOR, Dub. *Solution of Pernitrate of Mercury.*

"Take of pure mercury, *two ounces;* pure nitric acid, *one fluid ounce and a half;* distilled water, *one ounce and a half.* In the acid, first diluted with the water, dissolve the mercury with the application of heat, and evaporate the solution to the bulk of two ounces and a half."

Qualities and uses. — This preparation is a solution of nitrate or pernitrate of mercury, with excess of nitric acid. When applied to any part of the body, it acts as a powerful caustic, and has been recently much employed as such, especially in cancerous and other malignant ulcerations. It has been known to produce salivation, when externally applied.

HYDRARGYRI BISULPHURETUM[1], Lond. *Bisulphuret of Mercury, Cinnabar.*

"Take of mercury, *two pounds;* sulphur, *five ounces.* Having melted the sulphur over the fire, mix in the mercury, and immediately the mass swells remove the vessel from the fire, and cover it strongly to prevent it from catching fire; then rub to powder and sublime."

CINNABARIS, Edin. *Cinnabar, or Red Sulphuret of Mercury.*

Directions the same as the London, except that it is stated that the materials should be cold before they are reduced to powder.

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[1] Cinnabaris factitia, P. L. 1754. Hydrargyrus sulphuretus ruber, P. L. 1787. Hydrargyri sulphuretum rubrum, P. L. 1824.

Syn. Deuto-sulphure de Mercure; Sulphure de Mercure rouge (*F.*), Zinnober (*G.*), Deuto-solfuro di Mercurio (*I.*), Cinabrio (*S.*), Vermiljoen (*Dan.*), Krasnaia sernistaia rtut (*Russ.*), Shengerf (*H.*).

By this process the mercury and sulphur are more intimately combined, and a bisulphuret is produced. The inflammation which is apt to happen after the mixture of the mercury with the melted sulphur, when the mass swells and explodes, as frequently occurs, is similar to the combustion during the union of sulphur by heat with some other metals, independent of the presence of air; hence, covering the vessel, without removing it from the fire, does not check the combustion, although, by excluding the air, a real inflammation of the materials is prevented. In the second part of the process great caution is necessary to prevent the neck of the vessel in which it is sublimed from being choked up by the sublimed sulphuret; as by the occurrence of such an accident the vessel would be burst by the confined vapours. To avoid this, a wide-necked vessel should be used.

The cinnabar of commerce, which is chiefly used as a pigment, was first prepared by the Chinese; but the Dutch, having discovered the secret of obtaining it of a fine tint, manufactured it in Holland on a very extensive scale.[1] The following method has been proposed by Mr. Kirchoff, for obtaining it in the humid way. First, form ethiops mineral, by triturating, in a porcelain cup, with a glass pestle, 300 grains of mercury, and 68 of sulphur, moistened with a few drops of solution of potassa, and then add to it 160 grains of potassa, dissolved in an equal weight of water. Heat the vessel with the ingredients over the flame of a candle, continuing the trituration, and adding, as the fluid evaporates, pure water from time to time, so as to keep the ingredients covered to the depth of an inch. At the end of two hours, if the trituration have been continued, the colour of the mixture changes from black to brown, and then to red; after which no more water should be added, but the trituration must be uninterruptedly continued until the mass have acquired the consistence of a jelly, and the red colour attained considerable brightness and beauty; the heat must be then immediately withdrawn, otherwise the red soon changes to a dirty brown.[2]

Qualities. — Red or bisulphuret of mercury, factitious cinnabar, is a powder of a very bright red colour, which is inodorous, insipid, and insoluble in water, alcohol, and the majority of acids. It is decomposed, however, by nitrohydrochloric acid, which combines with the mercury, and disengages the sulphur: but it is not altered by solutions of the alkalies, even when boiled with them; although lime, potassa, soda, and most of the metals, decompose it when

[1] See a description of the method, *Annales de Chimie*, li. 196.

[2] *Nicholson's Journal*, 4to. ii. 1.

distilled with it. It consists of 1 eq. of mercury + 2 eq. of sulphur. Formula, $Hg\ S_2$. This preparation is sometimes adulterated with red lead, dragon's blood, brickdust, and chalk; the first is discovered by the same process as was described for discovering it in the red oxide; spirit of wine detects the second by extracting the colouring matter; the third by a residue being left after the application of a red heat; and the last by an effervescence being excited by hydrochloric acid; and the production of sulphate of lime on adding sulphuric acid.

Medical properties and uses. — Bisulphuret of mercury is supposed to be alterative and deobstruent. It was formerly much used in cutaneous diseases, gouty and rheumatic affections, and in worms. It is now, however, scarcely ever prescribed, being nearly inert. It has been recommended for fumigations in syphilis; but, on account of the sulphurous vapours, it is less fit for this purpose than the grey oxide. The dose for internal use is from grs. x. to ʒ ss., made into an electuary or bolus.

In concluding the account of the preparations of mercury, it may not be improper to observe that the exhibition of any of them in certain states of the habit, when at the same time the body is under exposure to cold, is apt to excite an erythematic eruption of the skin, accompanied with much fever. This disease does not at all depend on the use of any particular preparation of the remedy; but, as far as I have been able to observe, it is liable to show itself in such an irritable condition of the habit as produces hysteria in females, when the body is very suddenly exposed to a current of cold air, or to a cold moist atmosphere, while under the influence of mercury. When it occurs, the mercurials must be immediately discontinued, bark, opium, and purgatives internally administered; and the affected surface sprinkled with dry flour, or covered with the *linimentum calcis;* while at the same time the warm bath is to be used at least twice a day. Under this treatment the disease generally disappears, and the use of the mercurial may be renewed; but sometimes the morbid symptoms increase under every mode of treatment, and a fatal termination of the disease ensues.

PRÆPARATA E MAGNESIO.

PREPARATIONS OF MAGNESIUM.

MAGNESIA, Lond. Edin. Dub. *Magnesia.*

"Take of carbonate of magnesia, *one pound.* Burn it in a very strong fire for two hours."

Edinburgh.

"Take *any convenient quantity* of carbonate of magnesia. Expose it in a crucible to a full red heat for two hours, or till the powder, when suspended in water, presents no effervescence on the addition of muriatic acid. Preserve the product in well-closed bottles."

Dublin.

"Take of carbonate of magnesia, *any convenient quantity.* Introduce it into a clay crucible closed loosely by a lid, and let this be exposed to a low red heat, as long as a little of the magnesia, taken from the central part of the crucible, when cooled, and dropped into dilute sulphuric acid, continues to give rise to effervescence. Let the product be preserved in well-closed bottles."

Syn. Magnesie (*F.*), Gebrannte Magnesia (*G.*), Gebrennte Bidderzoutard (*Dutch*), Magnesia (*I.*), Genaia Magnezia (*Russ.*).

The carbonic acid and water are expelled by the heat, and the pure oxide remains.

Qualities. — It is inodorous and insipid; in the form of a white, very light, soft powder, having a specific gravity of 2·3. It has an alkaline reaction; does not effervesce with acids; is infusible; and requires for its solution 5142 parts of water at 60°, and 36,000 at 212°.[1] It does not become hot when mixed with water, as lime does; and water filtered through it does not affect the vegetable blues. When exposed to the air it attracts slowly carbonic acid. It is a compound of 60 parts of *magnesium*, and 40 of oxygen, in 100 parts; or of 1 eq. of magnesium + 1 eq. of oxygen. Formula $Mg\,O$.

By the London College the following characters are given: —

"Being moistened with water, it slightly changes the colour of turmeric to brown; it is soluble in hydrochloric acid without effervescence. Neither bicarbonate of potash or chloride of barium precipitate the solution."

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[1] Fyfe.

In the Edinburgh Pharmacopœia it is stated, in addition to the above, that, in the hydrochloric acid solution, "excess of ammonia occasions only a scanty precipitate of alumina, and that the filtered fluid is not precipitated by oxalate of ammonia," showing the absence of lime.

There is a variety of magnesia found in commerce which is much denser than the above, called heavy or condensed calcined magnesia.

Medical properties and uses. — The same as those of the carbonate. As an antacid it is less irritant than the alkalies; and on this account is in common use to counteract the excessive formation of uric acid. Its dose is from grs. x. to ʒ ss., taken in water or milk.

MAGNESIÆ CARBONAS[1], Lond. Edin. Dub. *Carbonate of Magnesia.*

"Take of sulphate of magnesia, *four pounds;* carbonate of soda, *four pounds and nine ounces;* boiling distilled water, *four gallons.* Dissolve separately the carbonate of soda and the sulphate of magnesia in two gallons of the water, and filter; then mix the solutions and boil, constantly stirring, with a spatula, for two hours, distilled water being frequently added that it may fill the same measure. Lastly, the liquor being poured off, wash the precipitated powder with boiling distilled water, and dry it."

Edinburgh.

"Take of sulphate of magnesia, *four pounds;* carbonate of soda, *four pounds and eight ounces;* water, *four gallons.* Dissolve the salts separately, each in two gallons of the water; mix the solutions, boil the mixture, and stir briskly for fifteen or twenty minutes. Collect the precipitate on a filter of linen or calico, wash it thoroughly with boiling water, and then dry it."

Dublin.

"Take of sulphate of magnesia of commerce, *ten ounces;* crystallized carbonate of soda of commerce, *twelve ounces;* distilled water, *a sufficient quantity.* Dissolve each salt in two quarts of water, mix the two solutions cold, and boil the mixture for ten minutes. Transfer the precipitate to a calico filter, and pour upon it, repeatedly, boiling water, until the washings cease to give a precipitate with a solution of nitrate of barytes. Lastly, dry by a heat not exceeding 212°.

Syn. Carbonate de Magnésie (*F.*), Kohlensaure Magnesia (*G.*), Carbonato di Magnesia (*I.*), Uglekislaia Magnezia (*Russ.*).

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[1] *Magnesia subcarbonas,* P. L. 1824.

The product of these processes is a compound of magnesia and carbonic acid. The quantity of the latter varies according to the mode of preparation. In its production the salts are decomposed, and a double exchange takes place; the sulphuric acid separates from the magnesia, and unites with the soda of the carbonate, disengaging the carbonic acid, which in its turn combines with the magnesia. The success of the operation depends very much on the degree of attention which is paid to the following circumstances: — The water employed in every part of the process must be very soft; either rain-water, or pure distilled water: the carbonate of soda should be previously freed as completely as possible from any admixture of silica, by passing through the alkaline solution a current of carbonic acid, or exposing it to the air for some time before it be used, and the mixing the salts in small portions of water; and after boiling the mixture, throwing it into a large quantity of water. Mr. Henry recommends to pour off the water by inclination, and to put the precipitate upon chalk stones for a little time; after which it is to be wrapped up in sheets of white paper, and dried before the fire.[1]

A great part, however, of the carbonate of magnesia found in the shops is prepared, on a great scale, from bittern, the liquor remaining after the crystallization of common salt from sea-water. The bittern is heated to 212°, a solution of impure carbonate of potassa instantly added to it, and the fire withdrawn. The other steps of the process resemble those above detailed. It is frequently adulterated with chalk, and sometimes gypsum: the former is detected by adding a little diluted sulphuric acid, which converts the magnesia into soluble sulphate, but produces a nearly insoluble salt with the lime of the chalk. Gypsum is detected by boiling a portion of the magnesia in distilled water, and adding to the solution chloride of barium, which will produce an insoluble precipitate if gypsum be present. Alumina is discovered by dissolving the carbonate of magnesia in an excess of hydrochloric acid and precipitating with ammonia.

Qualities. — Carbonate of magnesia is inodorous and insipid; perfectly white, very light, smooth to the touch, nearly insoluble in water, and effervesces with acids. Its specific gravity is 0·295.[2] It is decomposed by all the acids, the alkalies, the neutral and metallic salts, lime, baryta, alumina; these substances are therefore incompatible in prescriptions with it.

Medical properties and uses. — Carbonate of magnesia is antacid. It is a useful remedy in acidity of the primæ viæ, particularly of children, in aphthous fever, and that which attends dentition. The

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[1] *Henry's Experiments on the Preparation, &c. of Magnesia*, 8vo. Lond. 1773.
[2] *Hoffmanni Op.* iv. 473.

compound formed by its union with an acid in the stomach is purgative; but if no acid be present, magnesia does not appear to increase in any degree the peristaltic motion of the bowels. It is preferable to chalk and other absorbents in heartburn, when the bowels are costive; and it has been given with advantage in dysentery, combined with ipecacuanha and opium, and the dose followed by a draught of lemonade. In calculus, when the concretions are formed in the kidneys, no remedy is so efficacious. The extrication of the carbonic acid in the gaseous state, when the carbonate is decomposed by acid in the stomach, sometimes proves inconvenient from the distension it occasions: but more generally it is beneficial. The usual dose is from ʒ ss. to ʒ ij., taken in water or milk.[1]

Officinal preparation. — *Hydrargyrum cum Magnesiâ*, D.

MAGNESIÆ CARBONAS PONDERSUM, Dub. *Heavy Carbonate of Magnesia.*

"Take of sulphate of magnesia of commerce, *ten ounces;* crystallized carbonate of soda of commerce, *twelve ounces;* boiling distilled water, *a sufficient quantity.* Dissolve the sulphate of magnesia in half a pint, and the carbonate of soda in a pint of the water, mix the two solutions, and evaporate the whole to dryness by means of a sand-heat. Digest the residue for half an hour with one quart of boiling distilled water, and having collected the insoluble matter on a calico filter, treat it repeatedly with warm distilled water, until the washings cease to give a precipitate when suffered to drop into a solution of nitrate of barytes. Finally, dry the product at a heat not exceeding 212°."

The density of the carbonate of magnesia appears to depend on that of the solutions of the salts from which it is precipitated; hence the present preparation is much heavier than that made by the process for *Magnesiæ Carbonas.*

Qualities. — The specific gravity of this preparation is greater than that of the light carbonate in the proportion of about 1 to 3. Its appearance under the microscope is also very different; the light carbonate, according to Dr. Pereira[2], consists usually of an amorphous powder intermixed with slender prisms, having an effloresced appearance; whereas the heavy carbonate consists of granules of various sizes, the larger ones appearing to possess a high refractive power, and to be composed of concentric layers. In other respects, the two carbonates resemble each other.

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[1] The empirical nostrum, sold under the name of DALBY'S CARMINATIVE, consists of carbonate of magnesia, ℈ij., oil of peppermint ♏ j., oil of nutmeg ♏ij., oil of aniseed ♏ iij., tincture of castor ♏ xxx., tincture of assafœtida ♏ xv., spirit of pennyroyal ♏ xv., compound tincture of cardamoms ♏ xxx., and peppermint water f ʒ ij.

[2] *Elements of Materia Medica.*

PRÆPARATA E PLUMBO.

PREPARATIONS OF LEAD.

PLUMBI ACETAS, Edin. *Acetate of Lead.*[1]

"Take of pyroligneous acid (D. 1034), *two pints;* distilled water, *one pint;* litharge, *fourteen ounces.* Mix the acid and water, add the litharge, dissolve it with the aid of a gentle heat, filter, concentrate the solution sufficiently for crystallization on cooling."

Syn. Acetate de Plomb crystallisé (*F.*), Essigsaures Blei (*G.*), Zucchero di Saturno (*I.*).

In this process the acetic acid unites with the oxide; and the salt, after evaporation, crystallizes in the form of an acetate. But on account of the expense of the process the preparation of this salt is seldom undertaken by the apothecary. The acetate (*sugar of lead*) usually found in the shops, which is manufactured on a large scale for the use of the calico printers, is purified. It is chiefly prepared in Holland, in the following manner: — Sheets of lead, coiled up, are put into pots, in which they are half immersed in distilled vinegar, and digested a sufficient time: the upper half, or that which is not immersed, becomes covered with an efflorescence of carbonate of lead, after which it is immersed in the vinegar, and the part which was before immersed is now brought up to be converted into carbonate as before, when the plate is again turned; and this is repeated many times until the vinegar becomes milky. This solution is next boiled in tinned vessels down to about one third of the original quantity, then strained, and the salt crystallized by slow cooling. The crystals obtained by a second evaporation of the mother-water are brown and deliquescent[2]; and the whole requires to be again dissolved in rain or distilled water, and recrystallized.

Qualities. — This salt, when pure, is inodorous, has a sweet, astringent taste, and crystallizes in white, glossy, oblique-angled[3], six-sided prisms, which are generally aggregated into irregular masses. Its specific gravity is 2·35.[4] Acetate of lead slightly effloresces in dry air: it is soluble in 25 parts of distilled water, either hot or cold; but after standing for some time a slight decomposition takes place, and a small portion of white powder is

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[1] Saccharum Saturni, P. L. 1720—45. Cerussa acetata, P. L. 1787. Plumbi superacetas, P. L. 1809.

[2] *Aikin's Dictionary*, ii. 26.

[3] *Phillips's Trans. of the Pharm.* 1824.

[4] Hassenfratz.

deposited, which is an insoluble carbonate. It is also soluble in alcohol. In pump or hard water, which always contains carbonic acid, it is instantly decomposed, forming a milky solution, and a copious precipitate falls; it is also decomposed by the alkalies and their carbonates, most of the acids and neutral salts, lime and its salts, magnesia and its carbonate and sulphate, and all the sulphurets; but it is not affected by a solution of gum. It is decomposed also when exposed to a heat more than sufficient to fuse it; and a carbonaceous substance containing metallic lead remains; and pyroacetic acid is given off. It consists of 1 eq. of oxide of lead + 1 eq. of acetic acid + 3 eq. of water. Formula $Pb. O, C_4 H_3 O_3 + 3 H O$.

Medical properties and uses. — Taken internally, acetate of lead is a very powerful sedative astringent. It is a valuable remedy in pulmonary, uterine, and intestinal hæmorrhages; in restraining which it has a very powerful influence. Opium combined with it is supposed to prevent the deleterious effects which salts of lead are apt to produce when taken into the stomach; but this is an erroneous opinion. It is more advantageously administered with diluted distilled vinegar, to prevent its change into the carbonate, which renders it poisonous. Some years ago Dr. Hildebrand, of Lemberg, tried this salt, in combination with opium, with seeming advantage in phthisis[1]: and it has been since occasionally used in this country, but, as far as I have observed, it is not likely to be generally employed by British practitioners. Dissolved in a large proportion of water, with a small quantity of distilled vinegar to prevent decomposition, it forms an excellent collyrium in ophthalmia; and somewhat less diluted, its solution is in common use as an external application in superficial inflammation. Objections have, nevertheless, been raised to the long-continued external use of the preparations of lead; but my daily extensive employment of them in the form of acetate, without any bad effects, is a sufficient proof that, if the acetate occasionally has produced mischief, it is to be attributed to the chance of its change into the carbonate, which is the only *direct* poison among the salts of lead.

The dose of acetate of lead, when internally exhibited, is from grs. iij. to grs. x., given every six or eight hours. It may be made into a pill with crumb of bread, with or without opium, according to the circumstances of the case. As a collyrium or a lotion, the proportions may be from grs. x. to ℈ j. of the salt in f ℥ viij. of *distilled* water. The best indication of the approach of colic is a *blue line* on the gums. Many practitioners object even to the external application of acetate of lead; but I have used it

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[1] *Efficacy of the Internal Use of Superacetate of Lead in Pulmonary Consumption.* By T. Latham, M. D., F. R. S. *Medical Transactions*, vol. v. p. 341.

extensively, and have never found any bad effects to result from it, except in fermenting poultices, in which it is changed into the carbonate. (For the mode of counteracting these bad effects, see *Plumbi Carbonas*, Part II.)

Officinal preparations. — *Ceratum Plumbi Acetatis*, L. *Pilulæ Plumbi Opiatæ*, E.

LIQUOR PLUMBI DIACETATIS, Lond. *Solution of Diacetate of Lead.*[1]

" Take of acetate of lead, *two pounds and three ounces ;* oxide of lead, rubbed to powder, *one pound and four ounces ;* distilled water, *six pints.* Boil them for half an hour, assiduously stirring; and when the solution is cold, add as much distilled water as is sufficient to measure with it six pints. Lastly, strain. Let it be kept in a well-closed vessel."

PLUMBI DIACETATIS SOLUTIO, Edin. *Solution of Diacetate of Lead.*

" Take of acetate of lead, *six ounces and six drachms ;* litharge, in fine powder, *four ounces ;* water, *a pint and a half.* Boil the salt and litharge with the water for half an hour, stirring occasionally. When the solution is cold add water if necessary to make up a pint and a half; and then filter. Preserve the solution in well-closed bottles."

PLUMBI SUBACETATIS LIQUOR, Dub. *Solution of Subacetate of Lead.*

" Take of acetate of lead, *six ounces ;* litharge, in fine powder, *four ounces ;* distilled water, *two pints.* Dissolve the acetate of lead in the water, and, when the solution is raised to its boiling temperature, add the litharge in successive portions, and boil gently for half an hour. Add now as much distilled water as will supply what has been lost by evaporation, and filter through paper into a bottle, which should be furnished with an air-tight stopper. The specific gravity of this solution is 1066."

Syn. Sous-acetate de Plomb liquide (*F.*), Blei-extract (*G.*), Aceto di Saturno; Sotto-acetato di Piombo (*I.*).

In this process the acetate yields up a portion of its acid to the oxide of lead, by which means it becomes a diacetate. The sp. gr. of the Dublin preparation is 1·066, that of the London 1·260.

Qualities. — This solution of diacetate of lead, when properly

[1] *Aqua lythargyri acetati*, P. L. 1787. *Liquor Plumbi acetatis*, P. L. 1809. *Liquor Plumbi subacetatis*, P. L. 1824.

prepared, is nearly colourless; it has a slight acetous odour, and an austere, somewhat sweetish taste. It is partially decomposed when largely diluted with distilled water; and with pump-water a heavy precipitate instantly takes place: it is also precipitated in the form of a white subsalt by the alkalies and their carbonates; and a black precipitate of the sulphuret of lead is produced by sulphuretted hydrogen and the alkaline sulphurets. It is, indeed, the best test for detecting sulphuretted hydrogen in any compound. This solution is incompatible with solutions of mucilage of gum, which it coagulates; and, indeed, it is the most delicate test for gum with which we are acquainted. According to the experiments of Dr. Bostock[1], the constituents of 100 parts of the saturated solution are 23·1 of oxide of lead, 5 of acetic acid, and 71·9 of water. The crystallized salt consists of 1 eq. of acetic acid + 2 eq. of protoxide of lead + 10 eq. of water.

Medical properties and uses. — This solution is used only externally, and when diluted with *distilled* water forms a very useful, cooling, discutient, application to phlegmonous inflammations and burns. It was introduced into practice by M. Goulard, a surgeon of Montpelier; and hence its appellation of Goulard's Extract. It is very poisonous: even when topically applied to ulcerated surfaces, it has caused paralysis. Its internal administration, even in hydrophobia, in which it is said to have proved useful, is extremely hazardous.

LIQUOR PLUMBI DIACETATIS DILUTUS, Lond. *Diluted Solution of Diacetate of Lead.*[2]

"Take solution of diacetate of lead, *a fluid drachm and a half;* distilled water, *a pint;* proof spirit, *two fluid drachms.* Mix."

PLUMBI SUBACETATIS LIQUOR COMPOSITUS, Dub. *Compound Solution of Litharge.*

"Take of solution of subacetate of lead, proof spirit, of each, *two fluid ounces;* distilled water, *half a gallon.* Mix, filter, and preserve in a well-stopped bottle."

These preparations, as articles in the Pharmacopœia, are superfluous, every surgeon being in the habit of ordering lotions with different proportions of the solution of diacetate of lead, according to the circumstances of the case.

PLUMBI IODIDUM, Lond. Edin. Dub. *Iodide of Lead.*

"Take of acetate of lead, *eight ounces;* iodide of potassium,

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[1] *Nicholson's Journal*, xi. 75.

[2] *Aqua lythargyri acetati composita*, P. L. 1787. *Liquor Plumbi subacetatis*, P. L. 1824.

seven ounces; distilled water, *one gallon.* Dissolve the acetate in six pints of the water, and filter; add to the solution the iodide first dissolved in two pints of the water. Wash what is precipitated with cold distilled water, and dry. Let it be kept preserved from the light."

Edinburgh.

"Take of iodide of potassium and nitrate of lead, of each, *an ounce;* water, *a pint and a half.* Dissolve the salts separately, each in one half of the water; add the solutions; collect the precipitate on a filter of linen or calico, and wash it with water. Boil the powder in three gallons of water acidulated with three fluid ounces of pyroligneous acid. Let any undissolved matter subside, maintaining the temperature near the boiling point; and pour off the clear liquor, from which the iodide of lead will crystallize on cooling."

Dublin.

"Take of nitrate of lead, iodide of potassium, of each, *an ounce;* distilled water, *two pints.* Dissolve, with the aid of heat, the nitrate of lead in a pint, and the iodide of potassium in half a pint of the water, and mix the two solutions when cold. Decant the clear solution when the precipitate has subsided, and having transferred the latter to a filter, wash it with the remainder of the water. Finally, dry the product at a temperature not exceeding 212°, and preserve it in a close bottle."

The exchange in these processes is reciprocal: the oxygen of the oxide of lead of the acetate or the nitrate passes to the potassium, forming it into potassa, which, uniting with the acetic acid, produces an acetate of potassa, whilst the lead thus freed combines with iodine, also set free, and forms the iodide, which being nearly insoluble in cold water is precipitated and readily separated from the soluble acetate of potassa. The Edinburgh preparation is well adapted to afford a pure iodide, which is seldom procured by the London formula, the result being an oxide of lead mixed with the iodide of lead. The pyroligneous acid takes up the oxide and also any carbonate that may be present.

Mr. Squire, in his new work on the Pharmacopœias, remarks that in the London process it is better to add the solution of acetate of lead *cautiously* to prevent the formation of an oxiodide.

Qualities.—The iodide of lead is a bright golden-yellow coloured powder, when procured by the London and Dublin processes. It is inodorous, tasteless, and little soluble in water at 60°, but it dissolves readily when boiled in distilled water, and deposits, on cooling, brilliant golden-coloured crystalline scales, in which state

it forms the Edinburgh iodide. It dissolves in solution of pure potassa. It is decomposed by heat, the iodine being dissipated in vapour, and metallic lead left. It is a compound of 1 eq. of lead + 1 eq. of iodine. Formula Pb. I.

Medical properties and uses. — This iodide operates as a deobstruent in glandular obstructions; and, according to Valpeau, it has removed indolent scrofulous tumours, when iodine and its other compounds have failed. I have had no experience of its value as an internal medicine; but as an external application in aid of the other compounds of iodine internally administered, I have had ample opportunity of ascertaining its efficacy in discussing indolent tumours. I have generally ordered a stronger ointment than that of the Pharmacopœia, namely, ʒ jss. of the iodide to ℥ j. of lard. The dose of the iodide for internal use is gr. $\frac{1}{2}$ to grs. iv.

Officinal preparation. — *Unguentum Plumbi Iodidi*, L. D.

PLUMBI NITRAS, Edin. Dub. *Nitrate of Lead.*

"Take of litharge, *four ounces and a half;* diluted nitric acid, *a pint.* Dissolve the litharge to saturation with the aid of a gentle heat. Filter and set the liquid aside to crystallize. Concentrate the residual liquid to obtain more crystals."

Dublin.

"Take of litharge, in fine powder, *five ounces;* pure nitric acid, *two fluid ounces;* distilled water, *three pints;* dilute nitric acid, *a sufficient quantity.* To the litharge, placed in a porcelain dish, add the acid with a pint and a half of water, and applying a sand-heat, and occasionally stirring the mixture, evaporate the whole to dryness. Upon the residue boil the remainder of the water, clear the solution by filtration, and having acidulated it by the addition of a few drops of the dilute nitric acid, evaporate until a pellicle begins to form on its surface. The heat being now withdrawn, crystals will form, on the cooling of the solution, which should be dried on blotting paper in a warm atmosphere, and preserved in a close bottle."

This salt is a compound of 1 eq. oxide of lead + 1 eq. of nitric acid. Formula Pb. O, NO_5. It is only used to form the iodide of lead.

PRÆPARATA E POTASSIO.

PREPARATIONS OF POTASSIUM.

LIQUOR POTASSÆ,[1], Lond. *Solution of Potassa.*

"Take of carbonate of potassa, *fifteen ounces;* lime, *eight ounces;* boiling distilled water, *a gallon.* Dissolve the carbonate of potassa in half a gallon of the water. Sprinkle a little of the water on the lime in an earthen vessel, and the lime being slaked, add the rest of the water. Mix the hot liquors quickly together in a covered vessel, and agitate them frequently until they are cold. Then set aside until the carbonate of lime subsides. Lastly, keep the supernatant liquor, when poured off, in a well-stopped green glass bottle."

AQUA POTASSÆ, Edin. *Water of Potassa.*

"Take of carbonate of potassa (dry), *four ounces;* lime recently burnt, *two ounces;* water, *forty-five fluid ounces.* Let the lime be slaked, and converted into milk of lime with seven fluid ounces of the water. Dissolve the carbonate in the rest of the water; boil the solution, and add the milk of lime in successive portions, about $\frac{1}{8}$th at a time, boiling briskly for a few minutes after each addition. Pour the whole into a deep, narrow, glass vessel for twenty-four hours; and then withdraw with a syphon the clear liquid, which ought to amount to at least thirty-five fluid ounces, and should have a density of 1072."

POTASSÆ CAUSTICÆ LIQUOR, Dub. *Solution of Caustic Potassa.*

"Take of pure carbonate of potash, *one pound;* fresh burned lime, *ten ounces;* distilled water, *one gallon and seven ounces.* Slake the lime with seven ounces of the water, dissolve the carbonate of potash in the remainder of the water, and having raised the solution to the boiling point in a clean iron vessel, gradually mix with it the slaked lime, and continue the ebullition for ten minutes with constant stirring. Remove the vessel now from the fire, and when, by the subsidence of the insoluble matters, the supernatant liquor has become perfectly clear, transfer it by means of a syphon to a green glass bottle, furnished with an air-tight stopper. The specific gravity of this solution is 1068."

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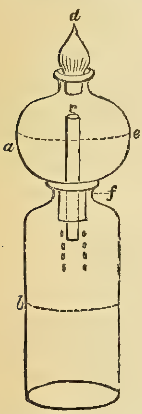
[1] Aqua Kali Puri, P. L. 1787. Lixivium Causticum, Potassa pura liquida.

Syn. Dissolution de Potasse (*F.*), Flüssiges ätzendes Kali (*G.*), Potachlog (*Dutch*), Liquore di Potassa (*I.*).

The *rationale* of these processes is very obvious: the lime is intended to attract the carbonic acid of the carbonate of potassa, and leaves its alkaline base dissolved in the water. In considering the proportions of the lime there appears *à priori* a much larger proportion ordered than is necessary for the decomposition of the carbonate of potassa: but the superabundance is necessary to insure the entire separation of the carbonic acid from the potassa. In all the formulæ the quantity of water is too small. Liebig has proved that ten parts of water, are necessary to aid the decomposition of one part of carbonate of potassa. With a small quantity of water no decomposition takes place; caustic potassa, in fact, decomposes carbonate of lime when the solution is not sufficiently diluted. The solution of pure potassa should be concentrated by boiling. If the solution be filtered, unless much care be taken to exclude the air during the filtration, carbonic acid will be rapidly attracted from the atmosphere. Calico is the best substance for stopping the mouth of the funnel, and it should be supported on a rough pebble or silicious stone, previously dropped into the funnel, and allowed to settle itself: but the present method of the Pharmacopœias is preferable to filtering, as no carbonic acid is attracted when the supernatant fluid is simply decanted from the carbonate of lime. When the solution is required to be used before there is time for the subsidence of the carbonate of lime, filtering may be necessary; and the simplest apparatus is that figured in the margin. It consists of a globular vessel *a*, fitted with a ground stopper *d*, and furnished with a perforated neck *f*, ground into the bottle *b*: a tube *c* is fixed into this neck, wrapped round with as much clean linen or calico as is required to fill up the orifice. In using this filter the solution is to be introduced into *a*, as high as *e*, so that the upper extremity of *c* shall be above the level of the fluid. The globular filter is then closed by the stopper, and as the filtering proceeds, the air displaced by the fluid dropping into *b*, passes up through *c*, and thereby does not interrupt the process. The solution should be kept in small green glass bottles, fitted with ground stoppers, to prevent the absorption of carbonic acid from the atmosphere.



Qualities. — Solution of potassa is inodorous, and so caustic as not to admit of being tasted. It is limpid, colourless, dense, and has an oily appearance when agitated; displays a strong alkaline reaction; does not effervesce with acids; and ought not to afford a precipitate with lime-water or barytic water; but it is seldom procured so pure. It feels soapy when rubbed between the fingers,

owing to the solution of the cuticle. It corrodes crown or white glass, and therefore it should be kept in green glass bottles. Prepared according to the formulæ of the Pharmacopœias, it is not a simple solution of potassa, but contains small portions of hydrochlorate and of sulphate of potassa, silica, and generally some lime. The presence of sulphates may be discovered by saturating a portion of the solution with nitric acid, then adding nitrate of baryta to precipitate the sulphates, if any; and, lastly, adding a solution of nitrate of silver, which is precipitated if any hydrochlorate be present. If lime be present, the addition of a carbonate of soda; or blowing into the solution through a tube will render it turbid; but these contaminations do not alter its properties as a remedy. One pint of the solution should weigh sixteen ounces; or the specific gravity be 1·063; and it should contain 4·7 per cent. of pure potassa.[1] The Edinburgh preparation has a density of 1072. If the solution be concentrated till the density reaches 1600, and then poured into a bottle and directly stopped, it will crystallize. It is incompatible with acids and acidulous salts, and with the carbonate, sesquicarbonate, acetate, and hydrochlorate of ammonia, and the metallic salts, especially the chlorides of mercury. It saponifies the oils, and converts also into a kind of soap the animal textures which it corrodes.

Liquor Potassæ can be distinguished from the corresponding *solution of soda* by many tests.

Excess of tartaric acid precipitates the potash solution, not that of soda. Bichloride of platium precipitates the potash yellow (in octohedrons).

Solution of antimoniate, or antimonite of potash, precipitates the solution of soda.

Potash salts colour purple the flame of a spirit lamp; soda salts, yellow.

Medical properties and uses. — This solution is antacid, diuretic, and lithontriptic. The two first properties it certainly possesses in a considerable degree: but its continued use, even when much diluted, is said to debilitate, and otherwise injure the stomach. As a solvent of calculus, both in the kidneys and the bladder, this alkali has long been celebrated: it acts, however, on calculi com-

[1] Table of the Strength of Solutions of Potassa.

Spec. Grav. Water=1·00.	Per cent. of Potassa.	Spec. Grav. Water=1·00.	Per cent. of Potassa.
1·47	39·6	1·15	13·
1·42	34·4	1·11	9·5
1·33	26·3	1·06	4·7
1·23	19·5		

posed of uric acid, or of urate of ammonia, only; the presence of which in the habit is known by a red deposit in the urine of the patient. But although the continued use of solution of pure potassa certainly renders the urine alkaline, yet there is reason to believe that its solvent influence on calculous matter in the kidney or in the bladder is not equivalent to the irritation which its long use excites both in the stomach and the bladder; and as a prophylactic, its place can be much better supplied by magnesia and the alkaline carbonates. This alkaline solution has also been found useful in gout; in indurations and enlargements of the glands, and in scrofula, and even secondary syphilis. Dr. Willan says, he has seen the most beneficial effects experienced from the internal use of this solution in lepra [1]: and from my own experience I can assert, that it may be almost regarded as a specific in the various species of psoriasis, which depend on an irritable state of the mucous membrane, caused by acidity of the primæ viæ, and a hasty and consequently imperfect formation of the juices of the stomach. It is also used as a local stimulant, much diluted, in the form of lotion, to the joints, in rachitis, and gouty swellings; and, in its concentrated state, as a caustic, to destroy the poison introduced by the bite of rabid or venomous animals. It displays almost a specific power in resolving spasm in the urethra, when a bougie is first dipped in a little oil and then in this solution, before being used.

The dose of this solution may be from ♏ x. to f ʒ j., taken in chicken-broth, milk, or bitter almond mixture [2]; but in severe cases of psoriasis I have gradually increased the dose to f ʒ ij. In cases of simple acidity of the stomach it may be administered in some bitter infusion, namely, infusion of orange-peel, or of wormwood.

When over-dosed, or taken as a poison, the influence of the alkali is best counteracted by acids; administering at the same time oil and demulcents.

POTASSA CUM CALCE, Lond. Edin. *Potassa with Lime.* [3]

"Take of hydrate of potassa, of lime, each *an ounce.* Rub them together, and keep them in a well-stopped bottle."

Edinburgh.

"Take *any convenient quantity* of aqua potassæ; evaporate it, in a clean covered iron vessel, to one third its volume; add slaked

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[1] *Willan on Cutaneous Diseases*, p. 141.

[2] Table-beer is sometimes recommended as the vehicle for administering it; but that liquor is seldom so free from acid as not to destroy the alkaline properties of the remedy.

[3] Calx e Kali Puro, P. L. 1778.

lime until the fluid has the consistence of firm pulp; preserve the product in well-stopped vessels."

POTASSA CAUSTICA CUM CALCE, Dub. *Caustic Potassa with Lime.*

"Take of caustic potash, fresh-burned lime, of each, *one ounce.* Rub them both rapidly to powder in a warm mortar, and introduce the mixture with as little delay as possible into a bottle furnished with an air-tight stopper."

The addition of the lime in these preparations renders the potassa less deliquescent, and consequently more manageable as an escharotic; but it is very seldom employed.

POTASSÆ HYDRAS, Lond. *Hydrate of Potassa.*[1]

"Take of solution of potassa, *a gallon.* Evaporate the water in a clean iron vessel over the fire, until, the ebullition having ceased, the hydrate of potassa melts: pour this into proper moulds.

POTASSA. Edin. *Potassa.*

"Take *any convenient quantity* of aqua potassæ. Evaporate it in a clean covered iron vessel, increasing gradually the heat till there remains an oily-looking fluid, a drop of which, when removed on a glass rod, becomes hard on cooling. Then pour the liquid out upon a bright clean iron plate; and as soon as it solidifies break it quickly, and put it into glass bottles secured with glass stoppers."

POTASSA CAUSTICA, Dub. *Caustic Potash.*

"Take of solution of caustic potash, *any convenient quantity.* Boil it in a silver or bright iron vessel, until its water has been evaporated away, and then raise the temperature until ebullition ceases, and a liquid is obtained which flows like oil. Pour this out upon a silver or iron dish, and, the moment it has set, break it into fragments, and enclose these in a green glass bottle furnished with an air-tight stopper."

Syn. Potasse caustique (*F.*), Kali Kalium oxyd (*G.*), Pietra caustica (*I.*), Reine Potasche (*Dutch*), Litoe vostnoe Kali (*Russ.*).

The concrete potassa procured by these processes is a hydrate, sufficiently pure for medical purposes, but it still contains the same foreign ingredients as the solution. To procure it as pure and free as possible from carbonic acid, the evaporation should be performed

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[1] Kali Purum, P. L. 1787. Cauterium potentiale, Lapis causticus, Potassa fusa, P. L. 1824.

in a silver or platinum vessel, very quickly: the vessel should be deep, so that the watery vapour which rises may exclude the atmospheric air. It is generally run into moulds, and formed into solid cylinders, which are kept in well-stopped bottles. The method of Berthollet[1] for obtaining it in perfect purity, which is usually described in chemical and pharmaceutical works, is too troublesome and expensive to be generally adopted. The following method proposed by Lowitz is more economical.

A solution of potassa must be evaporated till a pellicle form on its surface, then allowed to cool; and the saline deposit, which consists chiefly of the foreign salts, carefully separated. The evaporation is then to be renewed, skimming off the pellicles that form on the surface of the fluid, which, as soon as these cease to be produced, and the ebullition is ended, must be removed from the fire, and constantly stirred till it is cold. The mass is next to be dissolved in twice its weight of distilled cold water, the solution filtered, and evaporated in a clean iron or silver basin[2] until crystals are deposited. If the heated fluid consolidate into a mass, a small portion of water must be added, and the mass again heated to fluidity. The supernatant liquor, after the crystallizations, is left of a brown colour, which, after being kept for some time at rest in well-stopped phials, deposits the colouring matter, and may be evaporated and crystallized as before. The crystals obtained in the various evaporations are colourless hydrate of potassa.[3]

Qualities. — Concrete pure potassa is a fused *hydrate* of the salt. It should be a greyish-white, brittle substance, having somewhat of the peculiar odour of slaking quicklime, and a degree of causticity which prevents it from being tasted. It is usually, however, of a bluish colour. It attracts water and carbonic acid rapidly from the atmosphere, and is completely soluble in less than its own weight of that fluid at 60°, caloric being evolved during the solution. It dissolves readily in alcohol, a circumstance which enables it to be separated from the carbonates, which are insoluble in alcohol. When heated to 360° it fuses, and at a higher red heat is volatilized. Its sp. gr. is 1·706. It unites with sulphur, the acids, many of the metallic oxides, and the fixed oils. Its constituents are, 1 eq. of potassa[4] + 1 eq. water. Formula K O, H O.

The impurities are readily detected: thus, boiling water dissolves the pure salt entirely, but leaves any oxide of iron which may be present. Nitrate of baryta added to the solution, acidulated with

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[1] *Journal de Physique*, xxviii. 402.

[2] Lowitz orders the evaporation to be performed in a glass retort; but pure potassa, when hot, dissolves glass.

[3] *Nicholson's Journal*, 4to. i. 164.

[4] *Phillips's Trans. of Pharm.* 1837. Potassa is a protoxide of potassium, consisting of 1 potassium = 39 + 1 oxygen = 8: making the equivalent 47.

nitric acid, precipitates the sulphate of baryta if any sulphate be present; nitrate of silver detects the chlorides.

Medical properties and uses. — Concrete potassa is used only as an escharotic, for forming issues in diseases of the hip-joint, the spine, and in deep-seated inflammations. It erodes the skin and soft parts beneath it to a certain extent, destroying the life of the part, and forming a soapy compound, which is subsequently thrown off as a slough, and an ulcer is left. To prevent inconvenience from its deliquescent nature, the skin should be covered with a piece of calico, spread with adhesive plaster, doubled, and having a hole in its centre sufficient to bare the part only where it is intended to apply the caustic. It is much and justly recommended for the removal of strictures of the urethra.

POTASSÆ ACETAS, Lond. Edin. Dub. *Acetate of Potassa.*

"Take of carbonate of potassa, *a pound,* or *as much as may be necessary;* of acetic acid, *twenty-six fluid ounces;* distilled water, *twelve fluid ounces.* Mix the acid with the water, and add to it the carbonate of potassa to saturation; then filter. Evaporate the solution on a sand-bath, the heat being gradually applied until the salt is dried."

Edinburgh.

"Take of pyroligneous acid, *a pint and a half;* carbonate of potash (dry), *seven ounces,* or *a sufficiency.* Add the carbonate gradually to the acid till complete neutralization is accomplished. Evaporate the solution over the vapour-bath till it is so concentrated as to form a concrete mass when cold. Allow it to cool and crystallize in a solid cake; which must be broken up and immediately put into well-closed bottles."

Dublin.

"Take of pure carbonate of potash, *one pound;* acetic acid of commerce (sp. gr. 1044), *two pints.* To the acid, placed in a porcelain capsule, gradually add the carbonate of potash, and, when effervescence has ceased, boil for a couple of minutes. Add now, if necessary, a few drops of the same acetic acid, so that the solution may have a slightly acid reaction, and having evaporated to dryness, melt the residue, by the cautious application of heat, in a clean pot of cast iron. The liquefied salt is now to be removed from the fire, and when, upon cooling, it has solidified, it should be quickly broken into fragments of a suitable size, and enclosed in a bottle furnished with an air-tight stopper."

Syn. Kali acetatum, P. L. 1787. Acetate de Potasse (*F.*), Easigsaures Kali (*G.*), Azynzuure Potasch (*Dutch*), Acetate di Potassa (*I.*), Uksusnokisloe Kali (*Russ.*).

In these processes the acetic acid combines with the potassa of the carbonate, and expels the carbonic acid in a gaseous form, exciting effervescence. Owing to the largely diluted state of the acid in distilled vinegar, a very considerable quantity is required to saturate the potassa: the London and Dublin Colleges, therefore, now order the acetic acid to be used; and the Edinburgh College pyroligneous acid.[1]

Qualities. — Acetate of potassa has a slight, peculiar odour, and a warm, sharp taste. It is usually in white masses, of a foliated, soft texture, shining, and becoming soon moist if exposed to the air. Exposure to a red heat converts it into carbonate of potassa. One fluid ounce of distilled water at 60° dissolves 504 grains; or 100 parts of it are soluble in 102 parts of water, and in twice its weight of alcohol. It is sometimes adulterated with tartrate of potassa, which may be detected by adding to a solution of the salt a solution of acidulated acetate of lead: a precipitate will fall soluble in acetic acid. Sulphates are detected by adding a solution of a salt of baryta; and hydrochlorates, by adding nitrate of silver. In the watery solution the salt is spontaneously decomposed; and it is also decomposed by the strong acids; by tartaric acid, bitartrate of potassa, and by a decoction of tamarinds; the sulphates of soda and of magnesia; the hydrochlorate of ammonia; the tartrate of potassa and soda; and solutions of bichloride of mercury, and of the nitrate of silver.

It consists of single equivalents of acid and base, with 2 eq. of water of crystallization. Formula, $KO, C_4 H_3 O_3 + 2 HO$.

Medical properties and uses — Acetate of potassa is mildly cathartic and diuretic. It is found to be occasionally beneficial in febrile affections and jaundice; but its principal use is in dropsies, and other diseases in which a copious discharge of urine is required. The manner in which this is effected is endeavoured to be explained by Dr. Paris, by assuming, as a fact, that the stomach possesses "the power of readily decomposing all saline compounds, into which vegetable acids enter as ingredients, and of eliminating their alkaline base, which, being in the course of the circulation carried to the kidneys, excites them into action, and promotes the excretion of urine."[2] It also alters the character of the urine, rendering it neutral or alkaline, and may be employed as a lithontriptic. Acetate of potassa has also been recently used in the treatment of some chronic skin affections and with success. It is eliminated by the kidneys as carbonate of potassa. To produce its diuretic effect, the dose is from ℈ j. to ʒ j., given every three or

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[1] This salt was first described by Raym. Lully, and has been known by a great variety of names; as, for instance, *arcanum tartari*, *secret foliated earth of tartar*, *essential salt of wine*, *regenerated tartar*, *diuretic salt*, and *digestive salt of Silvius*.

[2] *Pharmacologia.*

four hours, in any bland fluid, or united with infusions of any of the lighter vegetable bitters, such as quassia, or orange-peel, or gentian. Doses of ʒ ij. or ʒ iij. open the bowels.

POTASSÆ CARBONAS PURUM, Edin. Dub. *Pure Carbonate of Potash.*

"Pure carbonate of potash may be most readily obtained by heating crystallized bicarbonate of potash to redness in a crucible, but more cheaply by dissolving bitartrate of potash in thirty parts of boiling water, separating and washing the crystals which form on cooling, heating them in a loosely-covered crucible to redness so long as fumes are discharged, breaking down the mass, and roasting it in an oven for two hours with occasional stirring; lixiviating the product with distilled water, filtering the solution thus obtained, evaporating the solution to dryness, granulating the salt towards the close by brisk agitation, and heating the granular salt nearly to redness. The product of either process must be kept in well-closed bottles."

Dublin.

"Take of white bitartrate of potash, *two pounds;* sesquicarbonate of ammonia, *half an ounce;* distilled water, *three pints.* Place the bitartrate of potash in an iron pot or crucible, and constantly stirring it with an iron rod, expose it to a red heat until vapours cease to be evolved. Reduce the residuum to a coarse powder, and, having boiled it for twenty minutes with one quart of the water, filter through paper, washing the filter and its contents with the residual pint of water in which the sesquicarbonate of ammonia has been first dissolved. The filtered solution is now to be evaporated to dryness, and a low red heat being finally applied, the product is to be rapidly reduced to powder in a warm mortar, and enclosed in well-stopped bottles."

POTASSÆ CARBONAS E LIXIVE CINERE, Dub. *Carbonate of Potassa from Pearl-ashes.*

"Take of pearl-ash, *ten pounds;* distilled water, *one gallon.* Pour the water on the pearl-ash, and macerate for a week, occasionally stirring the mixture. Filter through calico, and having evaporated the solution nearly to dryness, reduce the heat, and stir constantly with an iron rod, until granular crystals are obtained. Let these be immediately enclosed in well-stopped bottles."

Syn. Soucarbonate de Potasse (*F.*), Kohlensaures Kali (*G.*), Unvollmaakle Kohlenstoffzuure Potasch (*Dutch*), Sotto-carbonato di Potassa (*I.*), Uglekisloe Kali (*Russ.*)

The potash, or pearl-ash of commerce, is a heterogeneous mass, consisting chiefly of carbonate of potassa, with small portions of sulphate of potassa, chlorides of potassium and of sodium, silicious earth, oxide of iron, and oxide of manganese, in various proportions. The second Dublin process is intended to separate the

carbonate of potassa in a state sufficiently pure for medicinal purposes; the insoluble metallic salts, and the greater part of the silicious earth, are left on the filter when the solution is strained. The present process is improved by cold, instead of boiling distilled, water being used.

The product of the first process is also a carbonate of potassa. The degree of heat to which the bitartrate is exposed decomposes its tartaric acid; and by the re-union of two of its components, oxygen and carbon, carbonic acid is formed, which combines with the potassa, while the remaining carbonaceous matter produced by the decomposition is burnt out by the subsequent roasting. The resulting saline mass, besides carbonate of potassa, contains also a small portion of carbonate of lime and some argil, which, however, are separated by the solution and filtration.

Qualities. — The salt obtained by the above processes is a carbonate, being composed of one atom of each of its components. In its dry state it consists of carbonic acid 31·43, potassa 68·57, in 100 parts, or of 1 eq. of potassa + 1 eq. of carbonic acid, but in crystals it contains two equivalents of water. Formula, $KO, CO_2 + 2 HO$. It is in coarse white grains, which are so deliquescent that they soon attract from the air as much water as dissolves them, forming a fluid of the consistence of oil; a property which requires that the salt be kept in well-stopped bottles. Its taste is acrid and urinous: it changes to green the vegetable blue and red colours, combines with oils, and form soaps, and is decomposed by acids with effervescence.[1] It does not decompose tartrate of iron, with which it may be, therefore, ordered in prescriptions.

Carbonate of potassa is often adulterated, or very carelessly prepared. If one part of it be dissolved in eight parts of distilled water, and saturated with pure nitric acid, the presence of silicious earth will be indicated by the solution becoming turbid; and, by weighing the precipitate, its quantity may be ascertained. A precipitate being formed on the addition of chloride of barium indicates the presence of sulphates; a white precipitate turning bluish on exposure to the light, on adding nitrate of silver, proves the presence of hydrochlorates; calcareous earth is rendered evident by dropping into the solution a few drops of a solution of oxalic acid or oxalate of ammonia and silica by heating the saturated hydrochlorate to redness, and lixiviating: the silica remains undissolved. It is incompatible with acids and acidulous salts, hydrochlorate of ammonia, acetate of ammonia, sulphates, the salts of calcium, lime-water, and metallic salts.

Medical properties and uses. — Carbonate of potassa is deobstruent, diuretic, and antacid. In small doses, it is sometimes given in cases of glandular obstructions of the abdominal viscera,

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[1] *Nicholson's Journal,* 4to. iii. 215.

particularly hepatic obstructions, with seeming advantage; but it is not certain that the benefit does not arise from the effects of the remedy in correcting acidity of the primæ viæ. As an antacid it is useful in dyspepsia and gout. Its effects on the kidneys are considerable, when aided by plentiful dilution, and it passes through these organs without being decomposed. The dose as an antacid is from gr. x. to ʒ ss. The principal use, however, of this salt in medicine is for the formation of saline draughts, for which purpose it is given, in febrile affections, in combination with a solution of the citric acid, or with recent lemon juice, in the proportion of ℈ j. of the salt to f ʒ iv. of the lemon juice, or of an acid solution, containing grs. xviii. of citric acid. When given as an antacid, its taste and acrimony are most perfectly covered by milk. The dose is grs. x. to ʒ ss. In large doses it is nearly as poisonous as pure potassa, and requires the same antidotes, namely, acids, oil, and demulcents.

Officinal preparations.—Liquor Potassæ Carbonatis. L. D.

LIQUOR POTASSÆ CARBONATIS, Lond. Dub. *Solution of Carbonate of Potassa.*[1]

"Take of carbonate of potassa, *twenty ounces;* distilled water, *a pint.* Dissolve and strain."

The specific gravity of this solution is 1·473.

Dublin.

"Take of pure carbonate of potash, *ten ounces;* distilled water, *one pint.* Dissolve and filter."

The specific gravity of this solution is 1·310.

Syn. Dissolution de Soucarbonate de Potasse (*F.*), Flüssiges Kohlensaures Kali (*G.*), Liquore di Sotto-carbonato di Potassa (*I.*).

In both these formulæ the preparation is procured always of a definite strength. The bulk of the fluid is increased rather more than one-third part in the London preparation.

Qualities.—This solution should be perfectly clear, colourless, and inodorous; and possess the properties of the carbonate, from which it is prepared. It cannot enter into extemporaneous formulæ with vegetable infusions containing much tannic acid, or with lime-water, magnesia, sulphate of magnesia, or the metallic salts; as these substances decompose it, or are decomposed by it.

Medical properties and uses.—These are the same as those of the salt. The dose may be from ♏ x. to ʒ j., in any convenient vehicle.

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[1] Aq. Kali præparatum, P. L. 1787.

POTASSÆ BICARBONAS, Edin. Dub. *Bicarbonate of Potassa.*

Edinburgh.

"Take of carbonate of potassa, *six ounces;* carbonate of ammonia, *three ounces and a half.* Triturate the carbonate of ammonia to a very fine powder; mix with it the carbonate of potash, triturate them thoroughly together, adding by degrees a very little water, till a smooth and uniform pulp be formed. Dry this gradually at a temperature not exceeding 140°, triturating occasionally towards the close; and continue the desiccation till a fine powder be obtained, entirely free of ammoniacal odour."

Dublin.

"Take of carbonate of potash from pearl-ash, *one pound;* distilled water, *one quart;* muriatic acid of commerce, *one pint and a half;* water, *three pints;* chalk, in small fragments, *one pound,* or *a sufficient quantity.* Dilute the muriatic acid with the water, and having dissolved the carbonate of potash in the distilled water, filter the solution into a three-pint bottle capable of being tightly closed by a cork, also traversed by a glass tube, having been filled with the chalk, and placed in a glass or porcelain jar of the same height with itself, but of somewhat larger diameter: the exterior ends of the two tubes are to be connected air-tight by a tube of vulcanized Indian rubber. The cork of the bottle containing the carbonate of potash being placed loosely, and that of the other bottle tightly in its place, and the muriatic acid having been poured into the jar, in which is lodged the perforated bottle containing the chalk, the liberation of carbonic acid commences, and as soon as it is judged that a sufficient amount of it has been developed to expel completely the air from the apparatus, the cork of the carbonate of potash bottle is to be forced into it quite tight, and the process is to be abandoned to itself for a week. At the end of this time numerous crystals of the bicarbonate of potash will have formed, which are to be removed, shaken in a capsule with twice their bulk of cold water, which is to be rapidly decanted, next drained, and finally dried on bibulous paper by mere exposure to the atmosphere. The mother liquor, if filtered, and concentrated to one-half, at a temperature not exceeding 110°, will yield additional crystals. The tube immersed in the solution of carbonate of potash will have to be occasionally cleared of the crystals with which it is liable to become plugged, else the process will be suspended."

Syn. Carbonate de Potasse (*F.*), Kohlensaures Kali (*G.*), Koolenzuure Potasch (*Dutch*), Carbonato di Potassa (*I.*), Druch-Uglekisloe Kali (*Russ.*).

By these processes a pure and completely neutralized bicarbon-

ate of potassa is obtained, and any silex the carbonate may have contained is completely separated. In the process of the Edinburgh College, some minutiæ require attention. The sesquicarbonate of ammonia should be in very fine powder before it is added to the carbonate of potassa, so that the two salts may be thoroughly intermixed; and the exposure to the heat ordered should be continued as long as the least ammoniacal odour remains.

Qualities. — This salt[1], prepared by any of these formulæ, is inodorous, has a slightly alkaline taste, without any acrimony, and scarcely acts upon turmeric paper. It is in right rhombic prisms, odourless and colourless, having a mild saline taste. They are not altered by exposure to the air; are soluble in four parts of water, at 60°, and $\frac{5}{6}$ths of their weight of boiling water, in which they are partially decomposed, carbonic acid gas being emitted during the solution. They are insoluble in alcohol. A red heat expels one half of their carbonic acid, and reduces them to the state of the carbonate. Their spec. grav. is 2·012. The constituents of this salt, according to Mr. Phillips[2], are, carbonic acid, 43·56, potassa 47·53, and water 8·91, or of 2 eq. of carbonic acid + 1 eq. potassa + 1 eq. water. Formula $KO, HO, 2\,CO_2$. It is incompatible in formulæ with the acidulous salts, borax, hydrochlorate of ammonia, alum, sulphate of magnesia, lime-water, and all the metallic salts. Mr. Phillips remarks, that calomel, unless heat be applied, is not decomposed by it. The purity of this bicarbonate is determined by its solution not forming a brick-red precipitate with bichloride of mercury; and, when supersaturated with nitric acid, not giving precipitates with nitrate of silver, or nitrate of baryta.

Medical properties and uses. — On account of the increased quantity of carbonic acid which this salt contains, it is preferable to the common carbonate for effervescing draughts: but j. requires for saturation only grs. xv. of citric acid, or f ʒ iijss. of lemon-juice; but does not differ from it in properties as a remedy. The dose is from grs. x. to ʒ j.

POTASSÆ AQUA EFFERVESCENS, Edin. *Effervescing Solution of Potassa.*

"Take of bicarbonate of potassa, *one drachm;* of distilled water, *one pint.* Dissolve the salt in the water; and pass into the solution, under strong pressure, carbonic acid gas."

This solution is seldom sufficiently impregnated with the acid when made on a small scale; but in the great way, and with an apparatus from which a much greater pressure is obtained, a solu-

[1] This bicarbonate was first prepared by Cartheuser in 1752.

[2] *Trans. of Lond. Pharmacopœia.*

tion is prepared for sale, which contains a very large quantity of uncombined carbonic acid.

Qualities. — When properly prepared, it has a pungent, acidulous taste, and reddens tincture of litmus; is perfectly transparent, sparkles when poured into a glass, and effervesces violently with all the acids.

Medical properties and uses. — This solution of the acidulous bicarbonate is tonic and diuretic. It has also been regarded as lithontriptic, and is much used in calculous cases. The solution of the acidulous bicarbonate is a grateful mode of exhibiting potassa, as its acrimony is destroyed by its combination with the acid, which nevertheless does not interfere with its operation as an alkali. On the same principles it proves beneficial in dyspepsia and gout, and forms with lemon-juice an effervescing draught still preferable to that prepared with the bicarbonate. The dose in calculous affections is f ℥ viij., taken three or four times a day.

POTASSÆ NITRAS PURUM, Dub. *Pure Nitrate of Potassa.*

"Take of commercial nitre, *four pounds;* distilled water, *five pints,* or *a sufficient quantity.* Having dissolved the nitre in two pints of the water at a boiling temperature, let the heat be withdrawn, and the solution be stirred constantly as it cools, in order that the salt may be obtained in very minute crystals. These, deprived as much as possible of the uncrystallized solution by decantation and draining, are to be washed in a glass or earthenware percolator with the remainder of the water, or until the liquid which trickles through ceases to give a precipitate when dropped into a solution of nitrate of silver. The contents of the percolator should now be extracted and dried in an oven."

By this process, the impure nitre is freed from chlorides and other salts with which the commercial salt is apt to be contaminated.

POTASSÆ SULPHAS, Edin. Dub. *Sulphate of Potassa.*[1]

"Take of the residuum of the preparation of pure nitric acid, *two pounds;* boiling water, *two gallons;* white marble in powder, a *sufficiency.* Dissolve the salt in the water; add the marble gradually till effervescence ceases, and the solution is completely neutralized; filter the liquid, and evaporate it till a pellicle forms on the surface; then set it aside to cool and form crystals."

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[1] This name was imposed by the French chemists in 1787. The following are some of its old names: *nitrum fixum, arcanum duplicatum, sal de duobus, sal polychrestus, tartarum vitriolatum, kali vitriolatum.*

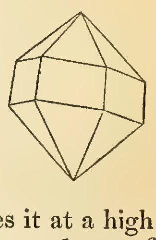
Dublin.

"Take of the residuum of the process for *Acidum Nitricum purum, one pound;* fresh burned lime, *six ounces;* water *two quarts;* carbonate of potash from pearl-ash, *one drachm;* dilute sulphuric acid, *six fluid drachms,* or *as much as is sufficient.* Slake the lime in four ounces of the water, and having dissolved the residuum of the nitric acid process in the remainder of the water, and raised the solution to the temperature of ebullition, gradually add to it the slaked lime, until reddened litmus paper immersed in it is restored to a blue colour. Filter the solution through calico, and to it, raised to the boiling point, add the carbonate of potash, as long as there is any precipitate. Filter again; add the dilute sulphuric acid, so as produce a neutral or very slightly acid solution; and, having evaporated this till a film forms on its surface, set it by for twenty-four hours. The crystals which will then have formed should be dried on blotting paper, and preserved for use."

Syn. Sulphate de Potasse (*F.*), Schwefelsaures Kali Vitriolweinstein (*G.*), Zwavelzuures Kali (*Dutch*), Solfato di Potassa (*I.*), Sernokisloe Kali (*Russ.*).

In the Edinburgh process, the marble, which is added to the solution of the salt, combines with the superfluous sulphuric acid, while the carbonic acid is expelled; and the residue is thus converted into sulphate of potassa. The greater part of the sulphate of commerce is prepared from the residue of the distillation of nitric acid from nitre and sulphate of iron. This is a mixture of sulphate of potassa and red oxide of iron, from which the sulphate is easily separated by boiling water, while the oxide remains undissolved.[1]

Qualities. — Sulphate of potassa has a nauseous, bitterish taste. It is usually procured in small, grouped, transparent crystals, of which the form is a six-sided pyramid, usually double, with a short intervening six-sided prism; but this form is subject to various modifications, according to the mode of conducting evaporation.[2] Their specific gravity is 2·4073. The crystals are hard, not efflorescent; they decrepitate when heated, and are soluble in 16 parts of water, at 60°, and 5 parts of boiling water: they do not contain any water of crystallization. The salt is decomposed by tartaric acid, by chloride of barium, chloride of calcium, bichloride of mercury, nitrate of silver, and acetate and diacetate of lead, which therefore cannot enter into formulæ with it. Charcoal also decomposes it at a high temperature. Its constituents are 1 eq. of potassa + 1 eq. of sulphuric acid. Formula, KO, SO_3.



[1] This oxide, when dried, is of a deep red colour, and is the *colcothar* of commerce.
[2] When a tepid solution of sulphate of potassa is in the act of crystallizing, light is evolved.

Medical properties and use. — This salt is deobstruent and cathartic. It is given with great advantage in the visceral obstructions to which children are liable; and, in combination with rhubarb or with aloes, I have found it more useful than any of the other saline purgatives, in jaundice and dyspeptic affections. On account of its sparing solubility, it is generally given in the form of powder, in doses of from grs. x. to ʒ j., according as it is intended to act as a deobstruent or a purgative.

It is contained in *Pulvis Ipecacuanhæ compositus*, L. E. D. *Pulvis Salinus compositus*, E.

POTASSÆ BISULPHAS, Edin. Dub. *Bisulphate of Potassa.*

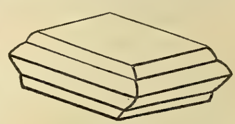
"Take of the residuum in the preparation of pure nitric acid, *two pounds;* sulphuric acid (commercial), *seven fluid ounces and one fluid drachm;* boiling water, *six pints.* Dissolve the salt in the water, add the acid, concentrate the solution, and set it aside to cool and form crystals."

Dublin.

"Take of sulphate of potash, in powder, *three ounces;* pure sulphuric acid, *one fluid ounce.* Place the acid and salt in a small porcelain capsule, and to this apply a heat capable of liquefying its contents; and which should be continued until acid vapours cease to be given off. The bisulphate, which concretes as it cools, should be reduced to a fine powder, and preserved in a well-stopped bottle."

Syn. Bisulphate de Potasse (*F.*), Doppelt Schwefelsaures Kali (*G.*), Deutosolfato di Potassa (*I.*), Druch-sernokkisloe Kali (*Russ.*).

Qualities. — This salt is the *sal enixum* of commerce. Its crystals, which are rhombic prisms, impress a sour and slightly bitter taste; and contain from 12 to 13 per cent. of water. It reddens the vegetable blues; is soluble in twice its weight of water at 60°; in less than an equal weight of boiling water; and effervesces with the carbonates of alkalies. The proportions of its constituents are 2 eq. of sulphuric acid + 1 eq. of potassa + 1 eq. of water. Formula, $KO, SO_3 + HO, SO_3$. Some chemists have given another equivalent of water to the salt. When exposed to a red heat, the water and half the acid are expelled, and simple sulphate of potassa remains.



Medical use. — As a remedy its efficacy is as yet unknown; but we are informed[1] that it was introduced into the London Pharmacopœia of 1836, from an idea that it would afford "a useful means

[1] *Powell's Translation of the London Pharmacopœia*, 2d ed. 73.

of producing the effects of sulphuric acid combined with those of a purgative salt; and it may be exhibited at once in a solid form, an indication which is often desirable." Dr. Paris says[1], it forms a grateful adjunct to rhubarb. The dose is from grs. x. to ℥ ij., exhibited in combination with infusion of some bitter or of rhubarb.

SULPHAS POTASSÆ CUM SULPHURE, Edin. *Sulphate of Potassa with Sulphur.*

"Take of nitrate of potassa and of sulphur, *equal parts.* Mix them thoroughly: throw the mixture in small successive portions into a red-hot crucible; and when the deflagration is over, and the salt has cooled, reduce it to powder, and preserve it in a well-closed bottle."

In this process the sulphur is oxidized, and converted partly into sulphuric acid, and partly into sulphurous acid, by uniting with the oxygen afforded by the decomposition of the nitric acid of the nitrate, which is effected by the degree of heat employed. During the deflagration, however, a part of the acid is volatilized in the form of nitrous oxide, and consequently the oxygen evolved is not sufficient to acidify all the sulphur, and the unaltered portion remains united with a portion of potassa. The sulphuric and sulphurous acids combine with the remainder of the potassa; hence the product is a mingled mass, consisting of sulphate, probably bisulphate of potassa, sulphite of potassa, and sulphuret of potassium. It is the preparation which was originally known under the name of *sal polychrest.*

Qualities. — This salt has a sensibly acid taste, and reddens infusion of litmus. It is almost wholly dissolved in eight parts of water, at 60°; and by exposure to the air it is altogether converted into sulphate of potassa.

Medical properties and uses. — The same as those of sulphate of potassa, and consequently it is scarcely ever used. Dose ℥ ss. to ℥ j.

POTASSÆ TARTRAS, Edin. Dub. *Tartrate of Potassa.*

"Take of bitartrate of potassa, *three pounds;* carbonate of potassa, *sixteen ounces,* or *as much as may be sufficient;* boiling water, *six pints.* Dissolve the carbonate in the water, and add the bitartrate till the liquor is neutralized; boil and filter. Concentrate the liquor, till a pellicle forms on its surface, and then set it aside to cool and crystallize. The residual liquor will yield more crystals by farther concentration and cooling."

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[1] *Pharmacologia.*

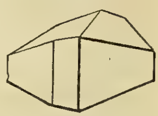
Dublin.

"Take of carbonate of potash from pearl-ash, *eight ounces;* white bitartrate of potash, in fine powder, *one pound,* or *a sufficient quantity;* distilled water, *half a gallon.* Dissolve the carbonate of potash in the water; and to the solution, while boiling hot, gradually add the bitartrate, until the liquid, after the ebullition has been continued for a couple of minutes, ceases to change the colour of blue or reddened litmus. Filter through calico, and having evaporated the clear liquor until a pellicle forms on its surface, set it by to crystallize. After twelve hours pour off the liquid, and having dried the crystals on bibulous paper, preserve them in a well-stopped bottle."

Syn. Kali Tartarizatum, P. L. 1787. Tartrate de Potasse (*F.*), Weinsteinsaures Kali (*G.*), Tartrato di Potassa (*I.*), Vinnokisloe-Kali (*Russ.*).

In these processes the superabundant acid of the bitartrate of potassa is saturated by the potassa of the carbonate, the carbonic acid gas of which is expelled, and a neutral tartrate is obtained. The quantity of alkali required for this purpose must necessarily vary, owing to the degree of dryness of the carbonate employed. To obtain regular crystals, a very slow, nearly spontaneous evaporation is necessary; and, therefore, this salt, as found in the shops, and prepared on a large scale, is in the form of a white granular powder, which is produced by the evaporation being continued to dryness with frequent stirring.[1]

Qualities. — This salt has a bitterish, cool taste. The primary form of its crystal is a right oblique-angled prism (see figure); and in this state it is soluble in its own weight of water at 60°: but in the granular form, four parts of cold water are required for its solution. It is slightly deliquescent. When long kept in solution, its acid is decomposed, and its alkali remains in the state of a carbonate[2]: and the same circumstances occur when it is exposed to a red heat. It is partially decomposed by the weaker acids and the acidulous salts; also by tamarinds, which convert it to the state of bitartrate; and it is completely decomposed by lime-water, chloride of barium, magnesia, nitrate of silver, and acetate and diacetate of lead. Its constituents are, 1 eq. of tartaric acid + 2 eq. of potassa.[3] When in crystals the salt contains 1 eq. of the tartrate + 4 eq. of water. Formula $2\,KO, C_8H_4O_{10} + 4\,HO$, or $2\,KO, \overline{T} + 4\,HO$. Tartaric acid being bibasic. Sometimes it appears to crystallize as an anhydrous salt.



[1] It was formerly named *soluble tartar, sal vegetabile, tartarus tartarisatus.*
[2] *Murray's Chemistry,* 2d edit. iv. 329.
[3] *Phillips's Trans. of the Pharmacopœia,* p. 56. 1837.

Medical properties and uses. — Tartrate of potassa is a valuable purgative, operating mildly, without griping; and even correcting the griping properties of senna and the resinous purgatives, with which it is, therefore, usually combined. It enters into Klein's *Pulvis lenitivus hypochondriacus*, which consists of the following articles: — ℞ Flavédinis Corticis Aurantiæ, Radicis Rhei, Potassæ Tartratis, āā ʒ ss., Olei Cajeputi gutt. iij. M. ft. pulvis una pro dosi.[1] When taken in small doses, it seems to alter the nature of the urine, rendering it neutral or alkaline; hence it might be employed for this purpose: it is also refrigerant. The dose of the tartrate is from ʒ j. to ℥ j. in solution as a purgative.

POTASSII SULPHURETUM, Edin. *Sulphuret of Potassium.*

"Take of sulphur, *one ounce;* carbonate of potassa, *four ounces.* Triturate them well together, and heat them in a covered crucible, till they form a uniform fused mass, which, when cold, is to be broken into fragments, and kept in well-closed vessels."

HEPAR SULPHURIS, Dub. *Liver of Sulphur.*

"Take of sublimed sulphur, *four ounces;* carbonate of potash from pearl-ash, first dried, and then reduced to powder, *seven ounces.* Mix these ingredients in a warm mortar, and, having introduced them into a Hessian crucible, let this be heated, first gradually, until effervescence has ceased, and, finally, to low redness, so as to produce perfect fusion; and let its liquid contents be then poured into an iron cup, over which a second vessel should be immediately inverted, so as to exclude the air as completely as possible, while solidification is taking place. The solid product thus obtained should, when cold, be broken into fragments, and immediately enclosed in a green glass bottle, furnished with an air-tight stopper."

Syn. Sulphure de Potasse (*F.*), Schwelflichtes Kali (*G.*), Solfuro di Potassa (*I.*).

This sulphuret cannot be properly formed by following the directions of any of the colleges: for, to render the action complete, it is necessary to expose the carbonate in a crucible to a red heat, previously to its being rubbed with the sulphur, in order to dissipate the water of the carbonate, and to expel a portion of the carbonic acid. When the fusion is effected, the mixture is to be poured upon a marble slab, and as soon as it concretes the mass should be broken in pieces and instantly put into a closely-stopped bottle. In this process the potassa, after the carbonic acid is expelled, is partly decomposed, and the oxygen of that portion com-

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[1] Quoted by Brande, *Manual of Pharm.* p. 232.

bining with a portion of the sulphur forms sulphuric acid, which combines with the undecomposed portion of the potassa, and forms sulphate of potassa. The remainder of the sulphur combines with the potassium and forms a sulphuret: thus making the result of the process a compound of one eq. of sulphate of potassa and three eq. of sulphuret of potassium.[1] ($3\,KS + KO,\ SO_3$.) It is said, however, to contain *tersulphuret of potassium, hypersulphate of potassa, sulphite of potassa, sulphate of potassa,* and *carbonate of potassa.*[2]

Qualities. — Well-prepared sulphuret of potassium is inodorous while dry; but when moistened or dissolved in water, a partial decomposition of both the water and the sulphuret is effected, and sulphuretted hydrogen is evolved. It has an acrid, bitter taste; changes the vegetable blues to green; is hard, brittle, breaking with a glassy fracture, has a liver-brown colour, and stains the skin brown.[3] By exposure to the air it attracts moisture; its colour changes to a pale green; the fœtid odour noticed above is emitted; and it is gradually converted into sulphate of potassa. It is also decomposed by all the acids which combine with the potassium, and the sulphur is precipitated. In a violent heat the sulphur sublimes, leaving the potassa.

Sulphuret of potassium, in small doses, is stimulant, expectorant, and diaphoretic. It has been frequently given in chronic asthma and bronchitis, and in pertussis, without much benefit; but it has been found useful in arthritic, rheumatic, and herpetic affections. and in combination with conium as a palliative in cancerous cases.[4] In large doses, internally administered, it operates as a powerful narcotico-acrid poison. It has been employed in France, for the cure of scabies, in the form of a bath; or of an ointment made with one part of the sulphuret, sixteen of soap, and thirty-two of oil. From a theory founded on its chemical action on metallic salts out of the body, it has also been strongly recommended as an antidote against arsenical, saturnine, and mercurial preparations, when these have been taken in doses sufficient to produce poisonous effects; but as far as concerns arsenical poisons, it has been recommended on erroneous principles, the sulphuret of arsenic being as poisonous as arsenious acid.

The usual dose is grs. v. or grs. viij., combined with soap, in the form of pills, for the first-mentioned cases; or from grs. v. to grs.

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[1] A simple or monosulphuret is formed by decomposing sulphate of potassa, by means of a high temperature, in a crucible lined with a charcoal lute, the vacant space being filled with charcoal rammed hard, and the cover luted on. The oxygen of both the potassa and of the sulphuric acid is carried off by the carbon, whilst the sulphur and the potassium remain in combination as a sulphuret.

[2] Winckler.

[3] Hence its old name, *hepar sulphuris.*

[4] *Pearson's Practical Synopsis, &c.*, i. 283.

x., as an adjunct to conium in cancer, given several times a day; or as an ointment, ʒj. to ℥j. of lard.

POTASSII IODIDUM, Edin. Dub. *Iodide of Potassium.*

"Take of iodine (dry), *five ounces;* fine iron wire, *three ounces;* water, *four pints;* carbonate of potash (dry), *two ounces and six drachms.* With the water, iodine, and iron wire, prepare the solution of iodide of iron. Add immediately, while it is hot, the carbonate of potash previously dissolved in a few ounces of water, stir carefully, filter the product, and wash the powder on the filter with a little water. Concentrate the liquor at a temperature short of ebullition, till a dry salt be obtained, which is to be purified from a little red oxide of iron and other impurities by dissolving it in less than its own weight of boiling water, or still better by boiling it in twice its weight of rectified spirit, filtering the solution and setting it aside to crystallize. More crystals will be obtained by concentrating and cooling the residual liquor."

Dublin.

"Take of pure iodine, reduced to powder, *four ounces and a half;* filings, or thin turnings of wrought iron, separated from impurities by a magnet, *two ounces;* pure carbonate of potash, *two ounces and a half,* or *a sufficient quantity;* distilled water, *three pints and a half.* Heat gently five ounces of the water with the iron, and three ounces of the iodine, for twenty minutes, and then boil until the solution loses its red colour. Filter then through paper, washing the filter with five ounces of water at a boiling temperature, and, in the solution thus obtained, dissolve, by digestion and shaking, the remainder of the iodine. To the carbonate of potash, dissolved in a quart of water, and heated to 212° in a large porcelain capsule, add the solution of iron and iodine, and boil until effervescence ceases, adding, if necessary, a little more carbonate of potash, so that the liquor may be very slightly alkaline. Filter now, washing the precipitate with the remaining pint of water, boiling hot, and, having evaporated the liquid till a pellicle begins to appear on its surface, let it be set by that crystals may form. These, when dried on blotting paper, should be preserved in a bottle furnished with a perfectly tight stopper. The liquor from which the crystals have separated will, by further evaporation and cooling, afford an additional quantity of the salt."

In these processes, by the action of the iodine upon the iron, aided by heat, a protiodide of that metal is first formed, which remains in solution; when carbonate of potassa is added, double decomposition ensues, and carbonate of iron and iodide of potassium are formed; the former being insoluble is precipitated, and the

iodide of potassium remains in the solution from which, after filtration, it can be crystallized by evaporation. Iodide of potassium can also be formed by the action of iodine upon caustic potassa; by which means, an iodide of potassium and iodate of potassa are first produced, and the latter must afterwards be converted into the iodide by exposure to a red heat, in order to drive off the oxygen. This process is adopted in the United States Pharmacopœia.

Qualities. — Iodide of potassium is obtained in white cubical crystals, inodorous, and having a penetrating, slightly bitter taste: it is deliquescent, and very soluble, 136 parts requiring only 100 of water at 60°. The London College gives the following tests for this salt: — "Soluble in six or eight parts of rectified spirit; very soluble in water. This aqueous solution does not at all, or only in a very slight manner, change the colour of turmeric to brown; it does not alter the colour of litmus: nitric acid and starch being added together, it becomes blue; tartaric and starch being added, it is not coloured. What is precipitated from the same solution by acetate of lead is yellow, and is soluble in boiling water; but nothing precipitates on the addition of lime-water or chloride of barium. Moreover, if that which is precipitated by nitrate of silver be digested in the stronger solution of ammonia, and nitric acid then added to the filtered liquor, nothing is precipitated from it. From 100 grains dissolved in water, by the addition of nitrate of silver, 141 grains of iodide of silver are precipitated." The iodide is a compound of 1 eq. of iodine + 1 eq. of potassium. Formula, K I.

Medical properties and uses. — Iodide of potassium acts as an excitant, alterant, and diuretic. Its action on the system appears to resemble very closely that produced by iodine (see Part II.), but it operates much less powerfully as a topical irritant. It has been employed very extensively in the treatment of scrofulous and syphilitic affections; sometimes in place of mercurial preparations, especially in scrofulous habits; sometimes after a course of that mineral. It is employed in the treatment of most of the secondary symptoms, as the sore throat, the skin diseases, nodes, &c. Iodide of potassium is also much used in the treatment of chronic forms of rheumatism; also to remove chronic enlargements of various organs, as the spleen, liver, lymphatic glands; also as an excitant to the secreting organs, as of the kidneys in dropsy, and to excite the secretions and alter their character in other organs, as of the uterus and vagina in amenorrhœa and leucorrhœa. When the dose of the salt is large, or in certain idiosyncrasies, it produces symptoms of irritation of the pulmonary and gastric mucous membranes, as coryza, with some inflammation of the eyelids, sore throat, cough, nausea, and occasionally vomiting; sometimes it produces graver symptoms, which have been detailed in Part II. under *Iodine.* It can be detected in the urine very shortly after its administration.

Dose.—Gr. j. to grs. v., and upwards; but to produce the good effects of the remedy, it is generally sufficient to give it in 5 grain doses, repeated two or three times a day. It is usually administered in solution.

Officinal preparations. — *Liq. Potassii Iodidi compositus,* L. D. *Unguentum Potassii Iodidi,* L. D.

LIQUOR POTASSII IODIDI COMPOSITUS, Lond. Dub. *Compound Solution of the Iodide of Potassium.*

"Take of the iodide of potassium, *ten grains;* of iodine, *five grains;* of distilled water, *one pint.* Mix that they may dissolve."

The Dublin College employs the same quantities.

The object of this solution is to enable a given quantity of water to take up a much larger proportion of iodine than it could otherwise do, as one grain of iodine requires fifteen ounces of distilled water for its solution.

LIQUOR IODINEI COMPOSITUS, Edin. *Compound Solution of Iodine.*

"Take of iodine, *two drachms;* iodide of potassium, *an ounce;* distilled water, *sixteen fluid ounces.* Dissolve the iodide and iodine in the water with gentle heat and agitation."

Qualities. — The solution is of a brown colour, exhales the odour of iodine, impresses its taste, and displays the evidence of its being present in a free state by the blue colour produced by the solution in starch.

Medical properties and uses. — It is the mode of administering iodine suggested by Lugol; and it is both a convenient and a useful form of the medicine, in scrofulous affections and bronchocele. The dose is f ʒ iij. to f ʒ vj. of the London and Dublin solutions, which are very weak; the Edinburgh preparation is strong, and its dose must be from ♏ vi. to ♏ xv. or ♏ xx.

In secondary syphilis, when what is termed mercurial cachexia displays itself, from the improper employment of mercurials, nothing proves more salutary than the iodide of potassium: it allays pain, restores the appetite, rouses the animal spirits, invigorates the body, and bestows flesh, in a few weeks, to the exhausted patient.

PREPARATA E SODIO.

PREPARATIONS OF SODIUM.

LIQUOR SODÆ, Lond. SODÆ CAUSTICÆ LIQUOR. Dub. *Caustic Solution of Soda.*

"Take of carbonate of soda, *thirty-one ounces;* lime, *nine ounces;* boiling distilled water, *a gallon.* Prepare the solution in the same manner in which it was directed for Liquor Potassæ."

Dublin.

"Take of crystallized carbonate of soda of commerce, *two pounds;* fresh-burned lime, *ten ounces;* distilled water, *one gallon and seven ounces.* Slack the lime with seven ounces of the water. Dissolve the carbonate of soda in the remainder of the water, and having raised the solution to the boiling point in a clean iron vessel, gradually mix with it the slacked lime, and continue the ebullition for ten minutes with constant stirring. Remove the vessel now from the fire, and when, by the subsidence of the insoluble matters, the supernatant liquor has become perfectly clear, transfer it by means of a syphon to a green glass bottle, furnished with an air-tight stopper. The specific gravity of this solution is 1056."

Qualities. — This preparation consists simply of the hydrate of soda dissolved in water: it has a strong alkaline reaction, is precipitated by solutions of the antimoniate and antimonite of potassa, but not by tartaric acid or chloride of platinum. The London preparation has the following characters: — "Its specific gravity is 1·061. In 100 grains are contained 11 grains of soda." The Dublin preparation contains rather less soda, and consequently its specific gravity is under that of the London solution.

Medical properties and uses. — It may be used in almost the same cases as the Liquor Potassæ; as, at present, we are not aware that these two alkalies differ in their action on the system. It acts as an antacid, alterative, and lithontriptic: we should, however, bear in mind that the urate of soda is much less soluble than the corresponding salt of potash. It is ordered to be employed by the London College in the preparation of the oxysulphuret of antimony, by the Dublin College in the process for valerianate of soda. Dose ♏ x. to ♏ xl., diluted with water or any bland liquid.

SODÆ ACETAS, Dub. *Acetate of Soda.*

"Take of crystallized carbonate of soda of commerce, *one pound, or a sufficient quantity;* acetic acid of commerce (sp. gr. 1044), *one pint.* To the acid, placed in a porcelain capsule, add by degrees the carbonate of soda, and, taking care that there shall be a slight

excess of acid, evaporate the resulting solution till a pellicle begins to form on its surface, and set it by to crystallize. The crystals when drained of the mother liquor, and dried by a short exposure to air on a porous brick, should be enclosed in a well-stopped bottle."

Qualities. — This salt has an acerb, bitter taste; is soluble in three parts of water at 60°; does not deliquesce, but loses its water of crystallization in a moderate temperature; in a greater heat, 600° Fahr., it is decomposed, and leaves as a residue carbonate of soda. Acetate of soda crystallizes in solid striated oblique rhombic prisms. It consists of 1 eq. of soda + 1 eq. of acetic acid + 6 eq. of water. Formula $NaO, C_4H_3O_3 + 6HO$.

Medical properties and uses. — Acetate of soda is diuretic, and may be used in the same cases as acetate of potassa, over which it possesses no advantages. Dose ℈j. to ʒj.

SODÆ BICARBONAS, Edin. Dub. *Bicarbonate of Soda.*

"Fill with fragments of marble a glass jar, open at the bottom and tubulated at the top; close the bottom in such a way as to keep in the marble without preventing the free passage of a fluid; connect the tubulature closely by a bent tube and corks with an empty bottle, and this in like manner with another bottle filled with one part of carbonate of soda and two parts of dried carbonate of soda well triturated together; and let the tube be long enough to reach the bottom of the bottle. Before closing the last cork closely immerse the jar to the top in diluted muriatic acid contained in any convenient vessel: when the whole apparatus is thus filled with carbonic acid gas, secure the last cork tightly, and let the action go on till next morning, or till gas is no longer absorbed by the salt. Remove the damp salt which is formed and dry it, either in the air without heat, or at a temperature not above 120°."

Dublin.

"Take of crystallized soda of commerce, *two pounds;* distilled water, *one quart;* muriatic acid of commerce, *one pint and a half;* water, *three pints;* chalk, in fragments, *one pound, or a sufficient quantity.* Having diluted the muriatic acid with the water, and dissolved the carbonate of soda in the *distilled* water, manipulate with these solutions, and with the chalk, as directed in the formula for *Potassæ Bicarbonas,* employing also the arrangement of apparatus there described. With the view, however, of obtaining from the mother liquor an additional quantity of bicarbonate, it is not necessary that the evaporation shall be preceded by a filtration."

Qualities. — This salt occurs usually as a white powder, or as very minute crystals, which are oblique quadrilateral tables. It is

soluble in 10 parts of water at 60° Fahr., but cannot be dissolved in boiling water without partial decomposition: it is slightly alkaline in reaction, and has a very much milder taste than the neutral carbonate. By the London College it is stated to be soluble in water, changes the colour of turmeric slightly brown, and from the solution neither bichloride of platina nor sulphate of magnesia, unless heat be applied, precipitate anything; the precipitate with chloride of barium is soluble in hydrochloric acid; and 100 grains of this salt added to diluted sulphuric acid, evolve 51·7 grains of carbonic acid." It is stated by the Edinburgh College, that a solution of this salt in 40 parts of water does not give an orange-coloured precipitate with a solution of corrosive sublimate. Bicarbonate of soda has a composition represented by the formula $Na\,O_1\,C\,O_2$ + $H\,O,\,C\,O_2$; or it is a double carbonate of soda and water. The salt is often adulterated, or contains the carbonate in a dry or effloresced state: this can be detected by the tests given above.

Medical properties and uses.—Similar to the neutral carbonate, but it is less apt to disturb the stomach, and may be administered in larger doses. It produces the same change in the urine as the carbonate. Dose gr. x. to ʒ ss.

SODÆ CARBONAS EXSICCATA, Lond. *Dried Carbonate of Soda.*

"Take of carbonate of soda, *a pound.* Expose the carbonate to heat until the crystals fall to powder, and afterwards heat it to redness. Lastly, rub it to powder."

SODÆ CARBONAS SICCATUM, Edin. Dub. *Dried Carbonate of Soda.*

"Heat *any convenient quantity* of carbonate of soda in a shallow vessel till it is dry, then urge it with a red heat in a crucible, and reduce it to powder when cold."

Dublin.

"Take of crystallized carbonate of soda of commerce, *any convenient quantity.* Expose it in a porcelain capsule to a pretty strong sand heat, until the liquid which first forms is converted into a dry cake, and having rubbed this to powder, enclose it in a bottle."

Syn. Soucarbonate de Soude sec (*F.*), Getiocknetes Kohlensaures Natrum (*G.*), Sotto-carbonato di Soda secco (*I.*), Unvollmaakte Koolenstoffzuure Soda (*Dutch*).

Owing to the great proportion of water of crystallization which the carbonate of soda contains it readily undergoes the watery fusion, and is completely dried by continuing the heat; but its properties are not otherwise altered. Fifty-four grains of it are equivalent to one hundred and forty-four grains of the crystallized

salt. The constituents are, 1 eq. of acid + 1 eq of soda. "It is dissolved by water; if dilute sulphuric acid be added to 100 grains, 40·7 grs. of carbonic acid are evolved" (London Pharmacopœia).

Medical properties and uses. — The chief advantage obtained from drying the carbonate of soda is the facility of exhibiting it in the form of pills; for when the crystallized salt is used for this purpose the pill formed with it falls to pieces as soon as the salt effloresces. Dr. Beddoes[1] has extolled it, in this form, as a remedy in calculous affections; and it certainly affords relief from the painful symptoms attending calculus in the kidneys, and other urinary affections: but its effects are palliative only, and depend on its neutralizing the excess of acid in the stomach. The dose is from grs. v. to grs. xv., given three times a day. Beddoes directed it to be combined with soap and aromatics.

SODÆ CARBONATIS LIQUOR, Dub. *Water of Carbonate of Soda.*

"Take of crystallized carbonate of soda, *one ounce and a half;* distilled water, *one pint.* Dissolve and filter. The specific gravity of this solution is 1026."

The only object of this process is to obtain a solution of a determinate strength.

SODÆ AQUA EFFERVESCENS, Edin. *Effervescing Solution of Soda.*

"Take of bicarbonate of soda, *one drachm;* water, *one pint.* Dissolve the bicarbonate in the water, and saturate it with carbonic acid under strong pressure. Preserve the liquid in well-closed vessels."

This preparation is manufactured on a great scale, of a much superior quality to any which the apothecary can prepare, and it is in very general use as a cooling beverage. Half a pint of it poured over two table-spoonsful of lemon-juice, sweetened with a little sugar, forms an excellent and very agreeable effervescing draught; and the same quantity poured upon two ounces of boiling milk forms an excellent substitute for asses' milk.[2]

SODÆ MURIAS PURUM, Edin. *Pure Muriate of Soda.*

"Take *any convenient quantity* of muriate of soda. Dissolve in boiling water; filter the solution, and boil it down over the fire,

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[1] *Beddoes on the Nature and Cure of Calculus.*

[2] What are termed *sodaic powders* are attempted to be passed upon the public as capable of answering in every respect the purpose of *soda water;* but the salt formed by the solution of these powders is a tartrate of soda, and not a bicarbonate. The powders are packed in two distinct papers, the one blue and the other white; the blue containing ʒ ss. of carbonate of soda, the white gr. xxv. of tartaric acid.

skimming off the crystals which form; wash the crystals quickly with cold water and dry them."

This appears to be an unnecessary process, as the best table salt is sufficiently pure for all pharmaceutical purposes. (When pure, the solution is not precipitated by solution of carbonate of ammonia followed by solution of phosphate of soda; a solution of nine grains in *distilled* water is not entirely precipitated by a solution of twenty-six grains of nitrate of silver. *Edin.*)

SODÆ PHOSPHAS, Edin. Dub. *Phosphate of Soda.*

"Take of bones, burnt to whiteness, *ten pounds;* sulphuric acid, *two pints and four fluid ounces;* carbonate of soda, *a sufficiency.* Pulverize the bones and mix them with the acid; add gradually six pints of water; digest for three days, replacing the water which evaporates; add six pints of boiling water, and strain through strong linen; pass more boiling water through the mass on the filter till it comes away nearly tasteless. Let the impurities subside in the united liquors. Pour off the clear liquor, and concentrate to six pints. Let the impurities again settle, and to the clear liquor, which is to be poured off and heated to ebullition, add carbonate of soda, previously dissolved in boiling water, until the acid is completely neutralized. Set the solution aside to cool and crystallize. More crystals will be obtained by successively evaporating, adding a little carbonate of soda, till the liquid exerts a feeble alkaline reaction on litmus paper, and then allowing it to cool. Preserve the crystals in well-closed vessels."

Dublin.

"Take of ox bones, burned to whiteness in a clear fire, *ten pounds;* oil of vitriol of commerce, *fifty-six fluid ounces;* distilled water, *four gallons and a half,* or *a sufficient quantity;* crystallized carbonate of soda of commerce, *twelve pounds,* or *a sufficient quantity.* On the bone-earth, reduced to a fine powder, and placed in a large dish of earthenware or lead, pour the oil of vitriol, and mix well with a glass or porcelain rod, so that every particle of the powder may be moistened by the acid. After the lapse of twenty-four hours, add gradually, and with constant stirring, one gallon of distilled water, and digest for forty-eight hours, pouring on occasionally a little water, so as to restore what has been lost by evaporation. Add now a second gallon of the water, and having well agitated the mixture and continued the digestion for another hour, let the whole be thrown upon a calico filter, and, when the liquid has ceased to trickle through, let the precipitate be repeatedly washed with boiling distilled water, until the washings allowed to drop on blue litmus paper, redden it only in a very slight degree. Concentrate the filtered solution and washings to the bulk of one gallon, and having set it by for twenty-four hours,

pass it through a filter. To the filtered solution, raised to the temperature of 212°, gradually add the carbonate of soda, previously dissolved in two gallons of boiling water, until the mixture acquires a slight alkaline reaction, and then place the whole upon a calico filter. The clear solution which passes through, when concentrated until a film begins to form on its surface, will, upon cooling, afford crystals of phosphate of soda; and from the mother liquor an additional product may be obtained by further concentration. The salt, when dried on blotting paper, should be preserved in a well-stopped bottle."

Syn. Phosphate de Soude (*F.*), Phosphosaures Natrum (*G.*), Fosfato di Soda (*I.*).

When bones are burnt to whiteness, the residue is chiefly phosphate of lime, with a small portion of carbonate. The addition of sulphuric acid, as directed in the above formulæ, abstracts the lime, so as to form an insoluble sulphate of lime, and, involved in its mass, a soluble superphosphate of lime, for the separation of which the digestion in vapour and the repeated effusions of boiling water are ordered. The soda of the carbonate of soda, which is added to the defecated and filtered solution, now unites with the free phosphoric acid, by which means the lime is again left combined with as much of this acid only as renders it a neutral phosphate, which from its insolubility precipitates, and is easily separated from the soluble phosphate of soda, which remains dissolved in the water, and crystallizes on the subsequent evaporation of the filtered liquor.

There are some niceties in the manipulation of this process that require to be noticed. In the first place, if too much sulphuric acid be employed, sulphate of soda will be also produced; secondly, as the phosphate of soda does not crystallize well without an excess of base, a little more carbonate of soda must be added than is required simply to neutralize the excess of acid of the superphosphate; and, lastly, the evaporation should not be carried quite to the formation of a pellicle, as in this case the crystallization is indeterminate, and the whole often concretes into an irregular mass.[1]

Qualities. — This salt has a purely saline taste, resembling very much that of common salt. Its crystals are large, regular, transparent, oblique, rhombic prisms, having a specific gravity of 1·333, and efflorescing on exposure to the air. It is soluble in four parts

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[1] A cheaper mode of preparing this salt has been given by M. Funcke, a German chemist. He adds to the matter of calcined bones, diffused in water, just enough dilute sulphuric acid to saturate the small portion of carbonate of lime it always contains. When the effervescence ceases, the whole is dissolved in nitric acid, and as much sulphate of soda added to the solution as of bone-ashes used. The whole is then distilled to recover the nitric acid; and the phosphate of soda is separated from the residue, which is a mixture of sulphate of lime and phosphate of soda, by solution and crystallization.

of water at 60°, and in two parts of boiling water; and undergoes the watery fusion when heated. It is insoluble in alcohol. Chloride of barium, lime, and magnesia, and nitrate of silver, decompose this salt; and, by the strong acids, it is converted into biphosphate of soda. The solution has an alkaline reaction, and the precipitate formed in it by chloride of barium is white, and dissolved by nitric acid without effervescence; that by nitrate of silver is yellow, and soluble in the same acid. At a red heat 100 grains lose 62·3 grains of water; and the solution of the remaining salt is precipitated white by nitrate of silver (Lond. Ph.).

The crystallized salt consists of 2 eq. of soda and 1 eq. of phosphoric, with 25 eq. of water; 24 eq. only of which are water of crystallization, the remaining one being basic.

Its formula is $2\ Na\ O,\ H\ O,\ P\ O_5 + 24\ H\ O$.

By heat the salt is converted into the pyrophosphate of soda.

Medical properties and uses. — It is a mild cathartic, excellently adapted for children, and others who have a fastidious taste. It may be given dissolved in gruel, or broth, made without salt, by which its taste is very effectually covered. The dose is from ʒ vj. to ℥ ij. Although phosphate of soda was known before 1740, at which time it was described by Haupt, under the name of *sal mirabile perlatum*, yet it was not introduced into medical use as a purgative until about thirty years since, when it was recommended by Dr. George Pearson of London.[1] Phosphate of soda may also be given to induce a less acid condition of urine, and for the purpose of keeping the uric acid in solution. For this purpose it should be given in small doses, as from ℈ j. to ʒ j., and frequently repeated.

SOLUTIO SODÆ PHOSPHATIS, Edin. (Tests.) *Solution of Phosphate of Soda.*

"Take of phosphate of soda, free of efflorescence, *one hundred and seventy-five grains;* distilled water, *eight fluid ounces.* Dissolve the salt in the water, and keep the solution in well-closed bottles."

A test for the salts of lead and sulphate of magnesia.

SODÆ SULPHAS, Edin. *Sulphate of Soda.*

"Take of the salt which remains after preparing pure muriatic acid, *two pounds;* boiling water, *three pints;* white marble, in powder, *a sufficiency.* Dissolve the salt in the water; add the marble as long as effervescence takes place; boil the liquid, and when neutral filter it. Wash the insoluble matter with boiling water, adding the water to the original liquid; concentrate until

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[1] *London Medical Review,* April, 1808, 139.

a pellicle begins to form, and then let the liquid cool and crystallize."

Syn. Natron Vitriolatum, P. L. 1787. Sulphate de Soude (*F.*), Krystalisirtes Natrum (*G.*), Solfato di Soda (*I.*).

Qualities. — The taste of this salt is at first simply saline, but afterwards very disagreeably bitter. Its crystals are transparent, six-sided, irregular, channelled prisms, with dihedral summits; efflorescent, and rapidly falling to an opaque white powder, when exposed to the air. It is soluble in 2·86 parts of water at 60°, but after the temperature reaches 92° its solubility diminishes, and at 215° it is of the same solubility as at 87°: it is not soluble in alcohol; it undergoes the watery fusion when heated [1], and in a strong heat is partially decomposed. The dry salt contains 1 eq. of soda and 1 eq. of sulphuric acid. In the crystallized state it has 10 eqs. of water. Formula $NaO, SO_3 + 10 HO$.

Medical properties and uses. — Sulphate of soda is a very common and useful purgative; but from its nauseous taste it is not very generally prescribed by the physician, although this may be readily disguised by a small quantity of lemon-juice, or of cream of tartar, added to the solution. It is incompatible in prescriptions with carbonate of potassa, chloride of calcium, nitrate of silver, acetate of lead, and strong tinctures. The dose is from ℥ ss. to ℥ ij., but, in the effloresced state, half of these quantities is sufficient. This salt forms the chief portion of the so-called "Cheltenham Salts."

SODÆ ET POTASSÆ TARTRAS [2], Edin. Dub. *Potassio-tartrate of Soda.*

"Take of bitartrate of potassa, *sixteen ounces;* carbonate of soda, *twelve ounces;* boiling water, *four pints.* Proceed for this preparation exactly as for the tartrate of potash."

Dublin.

"Take of crystallized carbonate of soda of commerce, *nine ounces;* white bitartrate of potash, in fine powder, *twelve ounces*, or *a sufficient quantity;* distilled water, *half a gallon.* Dissolve the carbonate of soda in the water, and to the solution, while boiling hot, gradually add the bitartrate until a neutral solution is obtained. Let this be filtered, evaporated till a pellicle forms on its surface, and then set to crystallize. After twelve hours the solution should be decanted off the crystals, and these, when dried on blotting-paper, should be preserved in a bottle. By further concentrating the

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[1] Mr. Faraday found that, when it is heated in a flask, one part dissolves in the water of crystallization, while the other is thrown down in an anhydrous state; and that at 180° $\frac{5}{9}$ of the salt take all the water, whilst $\frac{4}{9}$ separate in the dry state. *Journ. of Science*, vol. xix. p. 153.

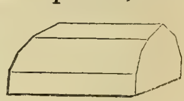
[2] Called Potassæ et Sodæ Tartras in the Edinburgh Pharmacopœia.

decanted solution, and cooling it, an additional crop of crystals may be obtained."

Syn. Tartrate de Soude et de Potasse (*F.*), Natrum-weinstein (*G.*), Tartrato di Potassa e di Soda (*I.*).

In these processes the superabundant acid of the bitartrate is saturated by the soda of the carbonate, the carbonic acid of which is dissipated in the gaseous form.

Qualities. — This salt has a bitter, saline taste. Its crystals are large, regular, transparent, hard, right rhombic prisms, but often in halves, as in the figure. They are slightly efflorescent, and soluble in five parts of water at 60°: are decomposed by the strong acids, chloride of barium, chloride of calcium, and by a red heat.



This salt consists of 1 eq. of tartaric acid ($C_8 H_4 O_{10}$) + 1 eq. of potash + 1 eq. of soda; and in its crystallized state, 10 eq. of water. Formula Na O, K O, T + 10 H O. The equivalent of tartaric acid was formerly considered to be only one half the one given above, and the crystals would then contain 1 eq. of tartrate of potassa + 1 of tartrate of soda + 10 eqs. of water. It is incompatible with mineral acids, acetate and diacetate of lead, chlorides of calcium and of barium. When the acids are added to its solution, they combine with a portion of the potassa, and the remainder is changed into bitartrate of potassa, which precipitates.

This salt may contain either an excess or a deficiency of tartaric acid; or chlorides or sulphates may be present in it. To ascertain its purity, therefore, no change should be produced on the colours of turmeric or of litmus paper; nor should any precipitate be formed in a solution of one part of the salt in twenty parts of water, when a solution of chloride of barium, and of nitrate of silver, is slowly dropped into it.

Medical properties and uses. — Tartrate of potassa and soda, or potassio-tartrate of soda, is a cooling and not very unpalatable cathartic. It was introduced into practice by M. Seignette[1], an apothecary of Rochelle, and the preparation kept a secret until it was discovered and published by Boulduc and Geoffrey, in 1731. It operates moderately, and without exciting much irritation; hence it is well suited for nephritic and puerperal cases. The dose is from ʒ ij. to ℥ j., dissolved in any convenient vehicle.

SODÆ VALERIANAS, Dub. *Valerianate of Soda.*

"Take of bichromate of potash, reduced to powder, *nine ounces;* fusel oil, *four fluid ounces;* oil of vitriol of commerce, *six fluid ounces and a half;* water, *half a gallon;* solution of caustic soda,

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[1] Hence its appellations of *Sal de Seignette, Sal Ruppellensis.*

one pint, or *as much as sufficient*. Dilute the oil of vitriol with ten ounces, and dissolve with the aid of heat the bichromate of potash in the remainder of the water. When both solutions have cooled down to nearly the temperature of the atmosphere, place them in a mattrass, and, having added the fusel oil, mix well by repeated shaking, until the temperature of the mixture, which first rises to about 150°, has fallen to 80° or 90°. The mattrass, having been now connected with a condenser, heat is to be applied, so as to distil over about half a gallon of liquid. Let this, when exactly saturated with the solution of caustic soda, be separated from a little oil that floats on its surface, and evaporated down until, the escape of aqueous vapour having entirely ceased, the residual salt is partially liquefied. The heat should now be withdrawn, and when the valerianate of soda has concreted, it is, while still warm, to be divided into fragments, and preserved in a well-stopped bottle."

Fusel oil or amylic alcohol ($C_{10}\ H_{12}\ O_2$), when oxidized by the means adopted in the above process, is converted into valerianic acid ($C_{10}\ H_9\ O_3 + H\ O$), — see *Alcohol Amylicum*, Part III. *Spirits*, — which is afterwards neutralized by the solution of caustic soda, and thus converted into valerianate of soda.

Qualities. — This salt is very deliquescent, readily fusing at 285° into a white concrete mass. It has somewhat the odour of valerian and a sweetish disagreeable taste. It is a compound of 1 eq. of soda and 1 eq. of valerianic acid. Formula $Na\,O + C_{10}\ H_9\ O_3$.

It is not used medicinally, but is employed to form the valerianates of iron, zinc, and quina.

LIQUOR SODÆ CHLORINATÆ, Lond. Dub. *Solution of Chlorinated Soda.*

"Take of carbonate of soda, *a pound;* distilled water, *forty-eight fluid ounces;* chloride of sodium, *four ounces;* binoxide of manganese, *three ounces;* sulphuric acid, *two and a half fluid ounces.* Dissolve the carbonate of soda in two pints of the water, then put the chloride and the binoxide, rubbed into powder, into a retort; and add to them the sulphuric acid previously mixed with three fluid ounces of water and cooled. Heat the mixture, and transmit the chlorine thus evolved, first through five ounces of water, and then the above-prescribed solution of the carbonate."

Dublin.

"Take of chlorinated lime, *half a pound;* water, *half a gallon;* crystallized carbonate of soda of commerce, *seven ounces.* Blend well, by trituration in a mortar, the chlorinated lime with three pints of the water, and, having transferred the mixture to a stop-

pered bottle, let this be well shaken several times for the space of three hours. Pour out the contents of the bottle on a calico cloth, and to the filtered solution add the carbonate of soda dissolved in the remaining pint of water. Having stirred the mixture well for ten minutes, separate the liquid by a second filtration, and preserve it in a well-stopped bottle.

"The specific gravity of this liquid is 1034."

In the first process the chlorine is extricated by the oxygen furnished from the binoxide of manganese combining with the sodium to form soda, which unites with the sulphuric acid, and constitutes a sulphate, whilst the chlorine escapes in the form of gas. The object of passing the liberated chlorine through water, before it enters the alkaline solution, is to free it from any hydrochloric acid which may be formed by a partial decomposition of the water of the mixed materials. The mixture formed with the alkaline solution and the chlorine closely resembles that which is known as *Labarraque's disinfecting soda liquid;* and is supposed to be a solution of hypochlorite of soda, bicarbonate of soda, and chloride of sodium. In the Dublin process, the salt of lime soluble in water, which is contained in the chlorinated lime, is decomposed by carbonate of soda, and the corresponding soda salt left in solution, at the same time the carbonate of lime is precipitated and separated by filtration.

Qualities. — The solution, whether recent, or formed from the crystals redissolved, is of a pale yellow colour, with a sharp, brackish, acerb taste, and evolves the odour of chlorine. It first browns and then bleaches turmeric paper: the browning depends on the carbonate of soda; the bleaching on the chlorine. When hydrochloric acid is added, carbonic acid gas and chlorine are disengaged; the former can be detected by its power of precipitating lime from its solutions; the latter by its power of decolouring solution of sulphate of indigo. The solid contents of the solution are bicarbonate of soda, of chloride of sodium, and hypochlorite of soda: it slowly evolves the chlorine when it is exposed to the air, and crystals of carbonate of soda form as the fluid evaporates.

Medical properties and uses. — This solution is astringent, and, if anything can strictly be so termed, antiseptic. I have administered it, largely diluted, in typhus and other low fevers, to counteract the sedative influence of the sulphuretted hydrogen which accumulates in the intestines in these fevers. I have found it, also, most valuable as an injection into the nostrils, for correcting the acrid, offensive coryzal discharge which takes place in malignant scarlatina. Its chief use, however, is as a disinfecting agent.

PRÆPARATUM E STANNO.

PREPARATION OF TIN.

STANNI PULVIS, Edin. Dub. *Powder of Tin.*

"Melt tin in an iron vessel, pour it into an earthenware mortar, heated a little above the melting point of the metal; triturate briskly as the metal cools, ceasing as soon as a considerable proportion is pulverized; sift the product, and repeat the process with what remains in the sieve."

Dublin.

"Take of grain tin, *a convenient quantity.* Melt the tin in a black-lead crucible, and while it is cooling stir it with a rod of iron until it is reduced to powder. Let the finer particles be separated by means of a sieve, and when, after having been several times in succession shaken with distilled water, the decanted liquor appears quite clear, let the product be dried and preserved for use."

Syn. Poudre d'Etain (*F.*), Zinn (*G.*), Stagno in polvere (*I.*).

By this process the tin is reduced to the form of a fine granular powder, and, perhaps, by the constant stirring, it is also very slightly oxidized, for the powder has less brilliancy than the entire metal.

Medical properties and uses.—Powder of tin is a mechanical anthelmintic. It has been chiefly given to expel the tape-worm; and is supposed to operate by the grittiness of its particles irritating the worm, and dislodging it from the mucus in which it is imbedded. It is given in doses of ʒ j. or ʒ ij., mixed in treacle, for two or three successive mornings, followed by a brisk cathartic. It is now seldom used.

PRÆPARATA E ZINCO.

PREPARATIONS OF ZINC.

ZINCI OXYDUM, Lond. Edin. Dub. *Oxide of Zinc.*[1]

"Take of sulphate of zinc, *one pound;* sesquicarbonate of am-

[1] The ancients, who were acquainted with it, called it Pompholyx; and by the early chemists it was named *Nihil album, Lana philosophica,* and *Flores Zinci.* Zincum calcinatum, P. L. 1787. In Holland it was prepared as a secret remedy, and sold under the names *Arcanum Ludemanni* and *Luna fixata,* until Gaubius made public its composition.

monia, *six ounces and a half;* distilled water, *three gallons.* Dissolve the sulphate of zinc and the sesquicarbonate of ammonia separately in twelve pints of the distilled water and strain, then mix them together. Wash the precipitate repeatedly with distilled water, and burn it for two hours in a strong fire."

Edinburgh.

"Take of sulphate of zinc, *twelve ounces;* carbonate of ammonia, *six ounces.* Dissolve each in two pints of water; mix the solutions; collect the precipitate on a filter of linen or calico; wash it thoroughly; squeeze and dry it, and expose it for two hours to a red heat."

Dublin.

"Take of carbonate of zinc, *any convenient quantity.* Place it in a clay crucible furnished with a cover, and expose it to a very low red heat until a portion of the contents of the crucible, taken from its centre, ceases to effervesce on being dropped into dilute sulphuric acid."

Syn. Oxide de Zinc (*F.*), Weisser Zinkoxyd (*G.*), Perossido di Zinco; Fiori di Zinco (*I.*), Okis Zinka (*Russ.*).

In the London and Edinburgh process, a carbonate of zinc is first formed by double decomposition; and this, when collected and exposed to heat, as directed, is converted into the oxide, the carbonic acid being driven off. In the Dublin process the carbonate is ordered to be made in a slightly different manner, described under *Zinci Carbonas,* and afterwards reduced by heat to the state of an oxide.

Qualities. — Protoxide of zinc thus prepared is inodorous, insipid, of a white, or yellowish-white colour, infusible in the fire, insoluble in water and alcohol, entirely soluble in acids, and in the alkalies: it is not soluble in the carbonates of the alkalies; nor is it altered by exposure to the air. It consists of 1 eq. of zinc + 1 eq. of oxygen. Formula $Zn\ O$. It often contains small portions of carbonic acid. It is frequently adulterated with chalk, and sometimes contains white lead and oxide of iron. By pouring sulphuric acid on the specimen, the first is discovered by the effervescence which is excited, the second by an insoluble sulphate of lead being formed; and by a sulphuret precipitating when a solution of sulphuretted hydrogen is poured on it.

Medical properties and uses. — Oxide of zinc is tonic and antispasmodic; and has been advantageously used in chorea, epilepsy[1] and some other spasmodic affections. It has been employed in hooping-cough on the Continent; and Lœffler recommends it to be used externally as well as internally in that disease. He em-

[1] *Duncan's Med. Comment.* iii. 216.

ploys a liniment, composed of linseed oil and oxide of zinc. It is chiefly used as an external application. (See *Ung. Zinci.*)

The dose, as an internal remedy, may be from gr. j. to grs. vj., given twice a day.

Officinal preparation.—*Unguentum Zinci*, L. E. D.

ZINCI CHLORIDUM, Lond. Dub. *Chloride of Zinc.*

"Take of hydrochloric acid, *a pint;* distilled water, *two pints;* zinc, broken into fragments, *seven ounces.* Mix the acid with the water, and to them add the zinc; and when the effervescence is nearly finished, apply heat until bubbles are no longer given off. Pour off the solution, strain, and evaporate until the salt is dried. Having fused this in a lightly covered crucible, pour it upon a flat and clean stone. Lastly, when it has become cold, break it into pieces, and keep it in a well-stopped vessel."

Dublin.

"Take of solution of chloride of zinc, *any convenient quantity.* Evaporate it down in a porcelain capsule so far, that, upon suffering the residual liquor to cool, it solidifies. Subdivide the product rapidly into fragments, and enclose them in a well-stopped bottle."

ZINCI CHLORIDI LIQUOR, Dub. *Solution of Chloride of Zinc.*

"Take of sheet zinc, *one pound;* muriatic acid of commerce, water, of each, *two pints and a half,* or *as much as may be sufficient;* solution of chlorinated lime, *one fluid ounce;* prepared chalk, *one ounce.* To the zinc, introduced into a porcelain capsule, gradually add the muriatic acid and water, applying heat until the metal is dissolved. Filter the liquid through calico, and, having added to it the solution of chlorinated lime, concentrate at a boiling temperature, until it occupies the bulk of one pint. Permit the solution now to cool down to the temperature of the air, place it in a bottle with the chalk, and, having first added distilled water, so that the bulk of the whole may be a quart, shake the mixture occasionally for twenty-four hours. Finally, filter, and preserve the product in a well-stopped bottle. The specific gravity of this liquor is 1593."

These processes resemble each other, except that the Dublin College order the use of chlorinated lime for the purpose of causing any iron, which may be present, to become perchlorinized; the peroxide of iron is afterwards precipitated by shaking with chalk. By the evaporation of the solution of the chloride of zinc the salt is obtained either as a dry mass, as ordered by the Dublin College, or it is afterwards fused, as ordered by the London College.

Qualities.—Chloride of zinc occurs, when recently fused, as a semitransparent white mass, but as left by simple evaporation as

an opaque salt. It has great affinity for water, in which it is very soluble, and, when exposed to air, readily deliquesces; it is also soluble in alcohol and ether. When heated it fuses and sublimes. Its solutions exhibit the characteristic properties of chlorine and zinc salts, being precipitated by solutions of salts of silver, by the fixed alkalies and ammonia, when not added in excess. Ferrocyanide of potassium and alkaline sulphurets also throw down from its solutions a white precipitate. Chloride of zinc is a compound of one equivalent of each of its constituents: its formula Zn Cl. Occasionally this salt contains traces of lead and iron, derived from the vessels in which it is prepared. These impurities can be readily detected by the action of sulphuretted hydrogen. A considerable quantity of arseniate of zinc has been found in the commercial salt by M. Lessaigne, which can be detected by its insolubility.

Medical properties and uses. — Chloride of zinc, when applied externally, acts as a powerful caustic and escharotic, producing considerable heat and pain, and then destroying vitality. As an escharotic it has been much employed in the treatment of cancerous and allied fungoid growths, and also for the formation of issues. It has considerable advantage as an escharotic over the arsenical preparations, in not producing any injurious constitutional effects if absorbed. It can be applied, made into a paste of any strength (according to the purpose for which it is required), with wheaten flour, or, as proposed by Dr. Ure, with anhydrous sulphate of lime. A solution of this salt may also be employed as a lotion in the treatment of gonorrhœa and chronic mucous discharges. The Dublin solution contains 175 grs. of zinc in the fluid ounce, and of this from 5 to 10 drops may be added to each ounce of water. Internally, chloride of zinc appears to act in the same way as the sulphate, namely, as a tonic and antispasmodic: it has been used in chorea, epilepsy, and allied nervous affections. The dose of the salt may be from gr. 1 to grs. 3, dissolved in water or spirit. In large doses it acts as a powerful corrosive poison, causing heat, nausea, vomiting, followed by cramps, coldness of surface, and coma. The best antidotes are the alkaline carbonates, or soap and water, which convert the salt into the insoluble carbonate. Sir William Burnett has proposed a solution of this salt, as a disinfectant and deodorizing agent; also for the purpose of preserving anatomical and other organic preparations. His solution contains 200 grs. of the salt to the ounce. It is known under the name of *Burnett's Disinfecting Fluid*; it is employed diluted with from 15 to 20 times its volume of water.

ZINCI ACETAS, Dub. *Acetate of Zinc.*

"Take of acetate of lead, *one pound;* sheet zinc, *four ounces;* distilled water, *two pints and a half;* solution of chlorinated lime, *a sufficient quantity.* Dissolve the acetate of lead in the water,

and, having placed the solution in a cylindric jar, immerse in it the zinc rolled into a coil. After the lapse of twenty-four hours, decant the liquid, and, having reduced it by evaporation to fifteen ounces, drop into it, while boiling hot, the solution of chlorinated lime, until a reddish precipitate ceases to form. It is now to be cleared by passing it through a filter, then acidulated by the addition of a few drops of acetic acid, and evaporated down to ten fluid ounces, when, upon cooling, crystals will form; these, and any additional crystals obtained by the concentration of the mother liquor, should be dried on blotting-paper placed on a porous brick, and then preserved in a well-stopped bottle."

When metallic zinc is introduced into a solution of acetate of lead, lead is precipitated, and the zinc dissolved; the addition of the chlorinated lime is for peroxidizing, and thus removing any iron that may be present. Care should be taken that all the lead is removed from the solution, which can be readily detected by the addition of iodide of potassium causing a yellow precipitate, if any lead remain. As some of the acetic acid is apt to fly off during evaporation, a few drops of that acid are ordered to be added.

Qualities. — Acetate of zinc occurs in white hexagonal plates, having a powerful styptic taste, very soluble in water, soluble also in alcohol, efflorescent when exposed to air. With strong mineral acids, acetic acid vapour is given off, and its solutions give the characteristic tests of zinc salts. Formula $Zn\,O,\ C_4\ H_3\ O_3 + 7\ H\ O$.

Medical properties and uses. — Externally acetate of zinc acts as a powerful astringent; and a solution of this salt (grs. iii. ad grs. x. to the ounce) may be employed in ophthalmia, gonorrhœa, &c. &c.: it may also be used as an ointment. Internally it acts as a tonic, antispasmodic; also emetic; and may be used in the same cases in which the sulphate is ordered. Dose gr. i. to grs. iii. or more.

ZINCI CARBONAS, Dub. *Carbonate of Zinc.*

"Take of solution of chloride of zinc, *one pint;* crystallized carbonate of soda of commerce, *two pounds;* boiling distilled water, *six pints.* To the carbonate of soda, dissolved in the water, add the solution of chloride of zinc, in successive portions, and boil until gas ceases to be evolved. Collect the precipitate on a calico filter, and, having poured on distilled water until the washings cease to cause turbidity when dropped into a solution of nitrate of silver containing free nitric acid, dry the product, first on blotting-paper placed on a porous brick, and finally by a steam or water heat."

This is simply a double decomposition: the carbonate of zinc being the insoluble product, is separated, washed, and dried.

Qualities. — Occurs in the form of a light white powder, which effervesces with acids, and the solution thus formed exhibits the ordinary properties of zinc salts. By heat it is decomposed, car-

bonic acid is driven off, and the oxide remains. It appears to be a sub-salt.

Medical properties and uses. — Externally it acts in the same way as *Calamina Preparata.* (See *Ceratum Calamina*, Part III.) Internally it may be used instead of the oxide. Dose grs. ii. to grs. x.

ZINCI SULPHAS[1], Edin. Dub. *Sulphate of Zinc.*

"This salt may be prepared either by dissolving fragments of zinc in diluted sulphuric acid till a neutral liquor be obtained, filtering the solution, and concentrating sufficiently for it to crystallize; or by repeatedly dissolving and crystallizing the impure sulphate of zinc of commerce, until the product, when dissolved in water, does not yield a black precipitate with tincture of galls, and corresponds with the characters laid down for sulphate of zinc."

Dublin.

"Take of zinc, laminated, or in small fragments, *four ounces;* oil of vitriol of commerce, *three fluid ounces;* distilled water, *one quart;* nitric acid of commerce, dilute sulphuric acid, of each, *a fluid drachm;* prepared chalk, *two drachms.* Place the zinc, oil of vitriol, and a pint of the water, in a porcelain capsule, and, when gas ceases to be developed, boil for ten minutes. Pass then the solution through a calico filter, and, having added to it the nitric acid, evaporate to dryness. Let the dry salt be dissolved in the remainder of the water, and let the solution, when cold, be shaken several times, for six hours, in a bottle with the chalk, and then cleared by passing it through a filter. It is now, after having been acidulated with the dilute sulphuric acid, to be evaporated till a pellicle begins to form on its surface, and then set to crystallize. The crystals thus obtained should be dried on blotting-paper without heat, and then preserved in a bottle. By further concentrating the solution from which the crystals have separated, an additional product will be obtained."

Syn. Sulphate de Zinc; Vitriole blanc (*F.*), Schwefelsaures Zinkoxyd (*G.*), Solfato di Zinco (*I.*), Vitriolo bianco (*S.*), Vitriolo branco (*Port.*), Hevit Vitriol (*Swed.*), Huril Vitriol (*Dan.*), Sernokisloi Zink (*Russ.*).

In these processes the acid enables the zinc to decompose the water, and the metal is oxidized by attracting its oxygen, while its hydrogen is disengaged with effervescence. The oxide thus formed combines with the acid, forming sulphate of zinc, which is obtained in crystals by the subsequent evaporation. In the Dublin process the addition of the nitric acid insures the peroxidation of any iron which may be present. The greater part, however, of

[1] Zincum vitriolatum, P. L. 1787.

the sulphate of zinc of the shops is prepared on a large scale, and purified in the manner that shall be immediately noticed. It is denominated *white vitriol* in the language of commerce, and is manufactured largely both in Germany[1] and England. In Germany it is prepared by exposing roasted blende to the air and humidity; by which means the metal is gradually oxidized, and combines with the sulphuric acid also formed from the sulphur contained in the blende. The sulphate thus produced is separated from the earthy parts of the blende by lixiviation; and after being boiled down it is crystallized, or rather concreted, into granular masses, resembling loaf-sugar; which generally contain sulphate of iron, of lead, and of copper. In England it is prepared generally by the direct combination of its constituents; but although purer than the foreign salt, yet the English sulphate almost always contains iron. Both kinds are purified by solution in water, and then allowing the solution to evaporate very slowly in an open vessel, containing some granulated zinc; the sulphate of lead will subside, and the other foreign salts be decomposed by the metallic zinc. The purified sulphate of zinc may be then crystallized by lixiviation and evaporation.[2]

Qualities. — Pure sulphate of zinc is inodorous, colourless, and has a slightly acidulous, styptic metallic taste. It crystallizes in transparent, quadrangular prisms[3], terminated by quadrangular pyramids; it effloresces slightly in the air; is soluble in 2·5 times its weight of water at 60°, and in less than its own weight of boiling water. It is decomposed by the alkalies, earths, the hydrosulphurets, and ferrocyanate of potassa; and throws down a dirty-looking precipitate from astringent vegetable infusions, with which, therefore, it is incompatible in prescriptions. It consists of 1 eq. of oxide of zinc, 1 eq. of sulphuric acid + 7 eq. of water. Formula $Zn\,O, S\,O_3 + 7\,H\,O$. One equivalent of the water of crystallization is held with a much greater force than the remaining six.

According to the London College, "It is soluble in water; the precipitate with ammonia is white, but is redissolved if the test be added in excess. What is thrown down by either chloride of barium or acetate of lead is not dissolved by dilute nitric acid. What is precipitated from 100 grains dissolved in water by sesquicarbonate of ammonia is reduced, at a high temperature, to 27·9 grains of oxide of zinc. Its purity is determined by ammonia throwing down, in its solution, a white precipitate soluble in an excess of ammonia."

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[1] Beckman, in his History of Inventions, says, it was first made at Ramelsberg, in Germany, about the middle of the 16th century. He ascribes the invention to Julius, Duke of Brunswick.

[2] *Aikin's Dictionary of Chemistry.*

[3] *Phillips's Trans. of the Pharm.* 1824.

Medical properties and uses. — Sulphate of zinc is tonic and astringent, and in large doses emetic. It is useful in dyspepsia, fluor albus, and some convulsive affections, as pertussis, chorea, and epilepsy; in which diseases it is generally combined with myrrh, bitter extracts, opium, extract of hemlock, or digitalis, according to the circumstances of the case. As an emetic it operates almost instantaneously, and, therefore, is often employed to empty the stomach at the commencement of the paroxysm of intermittent fever, and in other cases in which quick vomiting is required. In large doses it is poisonous.[1] As an external application, this salt, dissolved in rose-water, in the proportion of grs. jss. to f ℥ j. of rose-water, forms an excellent collyrium in the latter stage of ophthalmia, after the inflammatory action has subsided: it is a good injection in gonorrhœa; and a lotion in some kinds of superficial inflammations. The solution, double the strength, is the best application that can be used to scrofulous tumours, after they have suppurated, and the abscess has been discharged.

The dose, to produce vomiting, is from grs. x. to ʒ ss., and as a tonic from gr. j. to grs. ij. may be given twice a day.

It is contained in *Liquor Aluminis compositus, L.*

ZINCI VALERIANAS, Dub. *Valerianate of Zinc.*

"Take of valerianate of soda, *two ounces and a half;* sulphate of zinc, *two ounces and seven drachms;* distilled water, *one quart.* Dissolve the valerianate of soda in one half, and the sulphate of zinc in the remaining half of the water, and, having raised both solutions to 200°, mix them, and skim off the crystals which are produced. Let the solution be now evaporated at a temperature not exceeding 200°, until it is reduced to the bulk of four ounces, removing, as before, the crystals from the surface, in proportion as they form, and placing them with those already obtained. The salt thus procured is to be steeped for an hour in as much cold distilled water as is just sufficient to cover it, and then transferred to a paper filter, on which it is to be first drained, and then dried at a heat not exceeding 100°."

When the hot solutions of valerianate of soda and sulphate of zinc are mixed, double decomposition ensues, valerianate of zinc and sulphate of soda being formed, and the former salt, being sparingly soluble in water, forms crystals on its surface, which are ordered to be removed, and the solution afterwards concentrated, by which means fresh crops of crystals are produced and successively removed, until the whole of the salt has been separated from the solution: the crystals are afterwards to be carefully washed and dried.

[1] It is a singular fact that the Aranea *scenica* devours sulphate of zinc, and deprives it of its acid.

Qualities. — This salt usually occurs in the form of pearly scales of a brilliant whiteness, very light, having an odour of the valerianic acid, and an astringent taste. It is not very soluble in cold, but more so in hot water; soluble in alcohol and ether. When a solution of this salt, or any valerianate, is treated with a strong acid, it is decomposed and valerianic acid given off, by which means they can be recognised: by exposure to heat, or to the long continued action of air, valerianate of zinc is decomposed. When the salt is prepared according to the directions of the Dublin College, then it is anhydrous, containing one equivalent of zinc united with one equivalent of the acid. Formula $Zn\,O + C_{10}\,H_9\,O_3$; but it can be crystallized with 12 eqs. of water. On account of the high price of this salt a short time since, viz. before the publication of the Dublin Pharmacopœia, 1850, this drug was very extensively adulterated; sometimes other zinc salts, as the acetate, were substituted, the odour being given by a few drops of oil of valerian: a great quantity of that sold in France under this name consisted entirely of the butyrate of zinc, which much resembles the valerianate. The addition of a few drops of a strong acid will distinguish the valerianate from any other zinc salt but the butyrate, by its causing the strong odour of the acid to be evolved, and the butyrate may be recognized by distillation in a retort with sulphuric acid, and testing the product with a strong solution of acetate of copper, which throws down a bluish-white precipitate with butyric, but not with valerianic acid.

Medical properties and uses. — Valerianate of zinc acts as a powerful antispasmodic, and at the same time as a tonic. It is doubtful whether or not its therapeutic value is greater than that of a compound of valerian and an ordinary zinc salt. Some physicians, as Dr. Neligan, think it possesses peculiar powers. It has been used with success in nervous affections, as in the different forms of neuralgia, especially hemicrania, facial neuralgia, and vertigo, also to allay various hysterical affections, as palpitation of the heart, likewise in epilepsy and chorea.

Dose gr. i. to gr. ij. or iij., twice or three times a day, in the form of pill. It must be remembered that acid substances decompose it.

MISTURÆ.

MIXTURES.

THE term mixture in pharmaceutical language denotes a mingled compound, in which different ingredients are held suspended in a fluid medium by means of mucilaginous or of saccharine matter. The Colleges have placed under this title those medicines, also, which consist of the fixed oil of seeds diffused through water by means of the mucilage, fecula, or saccharine matter of the seeds, and which are denominated *emulsions.* Both these kinds of preparations should always be extemporaneous; and in prescribing them attention is required not to bring together incompatible substances, nor to order in mixtures insoluble matters of a specific gravity too great to be suspended, in the fluid vehicle, by the ordinary means.

MISTURA ACACIÆ, Lond.[1] *Mixture of Acacia.*

"Take of acacia, powdered, *ten ounces;* boiling distilled water, *a pint.* Rub the acacia with the water gradually poured in, and dissolve it."

MUCILAGO, Edin. Dub. *Mucilage.*

"Take of gum arabic, *nine ounces;* cold water, *one pint.*. Mix them; let the gum dissolve without applying heat, but with occasional stirring; strain through linen or calico."

Dublin.

"Take of gum arabic, *four ounces;* water, *six ounces.* Dissolve the gum in the water, with occasional stirring, then strain through flannel."

Syn. Mucilage de Gomme Arabique (*F.*), Schlieim de Arabiche Gummi (*G.*), Mucilagine de Gomma Arabica (*I.*).

The straining through linen or flannel is very necessary, as the gum is often mixed with small pieces of wood and other impurities. The mucilage, procured without heat, as directed by the Edinburgh College, is viscid, thick, and adhesive; semipellucid, and nearly colourless, if the gum be good. It has a faint, peculiar odour, is insipid, and, if not too thin, it may be kept without altering for a considerable time; but at length it becomes sour and acrid. The strong acids act on it as they do on gum; but when diluted, they do not alter mucilage. Alcohol converts it into a white curd; but proof spirit produces scarcely any alteration: no change is

[1] Mucilago Acaciæ, P. L. 1809. 1824.

caused by spirit of nitric ether; but sulphuric ether and compound spirit of ether precipitate a thick, white, tenacious curd. Tincture of sesquichloride of iron, even when diluted, converts mucilage into a brownish or orange-coloured, insoluble jelly; and diacetate of lead gives a copious, dense, flaky precipitate, which is a compound of gum and oxide of lead. No change is produced by solutions of the following metallic substances: — acetate of lead, sulphate of iron, sulphate of zinc, bichloride of mercury, and tartarised antimony; nor by the alkalies nor the neutral salts. Mucilage, like gum, serves to combine resins, oils, and balsams with water, for which purpose, and to give tenacity to pills, it is much employed in pharmacy. Mr. Montgomery informs us, that for suspending *oils* in water, ¾ths of their weight of gum is required; equal parts for *balsams* and *spermaceti;* for *resins,* two parts; and *musk,* five times its weight.[1] Newly made gum-mucilage, when rubbed with guaiacum, becomes blue.

Medical properties and uses. — The properties of mucilage are the same as those of gum. (See Part II.) It is the usual basis of demulcent mixtures for allaying the tickling, which excites cough, in catarrh, and phthisis[2]; and, combined with opium and other narcotics, it is useful in diarrhœa, dysentery, calculous affections, and ardor urinæ. Mr. Rhind of Edinburgh has proposed to use mucilage of gum as a remedy in burns and scalds. It can only act as a varnish in protecting the inflamed surface from the action of the air.[3] The dose of mucilage may be from f℥ss. to f℥j., frequently repeated.

MISTURA ALTHÆA, Edin. *Althæa Mixture.*

"Take of dried althæa root, *four ounces;* raisins, freed of the seeds, *two ounces*; boiling water, *five pints.* Boil down to three pints, strain through linen or calico, and, when the sediment has subsided, pour off the clear liquor for use."

Marsh-mallows contain a considerable quantity of mucus, which is thus extracted unaltered by water. The simple decoction of the roots is viscid, of a pale-yellow colour, sweetish, and has a peculiar odour resembling that of boiled turnips. In the above preparation, the raisins increase its sweetness, and render it more palatable.

Medical properties and uses. — This decoction or mixture is a useful demulcent in visceral inflammations, calculous affections, gonorrhœa, strangury, and other diseases of the urinary organs. The dose is a cupful, frequently taken; but in inflammation of the urinary organs, and in similar cases, it may be drunk *ad libitum,* as a common beverage.

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[1] *Observ. on Dublin Pharm.* 1826.

[2] ℞ Mucilaginis Acaciæ f℥j. Olei Amygdalarum, Syrupi Papaveris Albi, ā ā f℥ss., Aquæ f℥iv., Acidi Citrici, q. s. ad gratam acidulat. M. ut fiat mistura cujus sumat æger cochl. med. unum subinde.

[3] *Edin. Med. and Surg. Journ.* Oct. 1842.

MISTURA AMYGDALÆ, Lond. Edin. Dub. *Almond Mixture.*

"Take of confection of almond, *two ounces and a half*; distilled water, *a pint.* Gradually add the water to the confection of almond, while triturating, until they are mixed; then strain through linen."

Edinburgh.

"Take of the conserve of almonds, *two ounces*; water, *two pints.* Add the water gradually to the confection, triturating constantly; and then strain through linen or calico."

Dublin.

"Take of sweet almonds, *five drachms*; refined sugar, *two drachms*; gum arabic, in powder, *one drachm*; distilled water, *eight ounces.* Steep the almonds in hot water for five minutes, and, having removed their external coat, rub them with the sugar and gum, in a mortar, into a coarse powder; add the water gradually, and triturate so as to form a uniform mixture. Finally, strain through muslin."

MISTURA ACACIÆ, Edin. *Emulsion of Gum Arabic.*

"Take of mucilage, *three fluid ounces*; sweet almonds, *ten drachms*; pure sugar, *five drachms*; water, *two pints.* Steep the almonds in hot water, and peel them; beat them to a smooth pulp in an earthenware or marble mortar, first with the sugar and then with the mucilage; add the water gradually, stirring constantly; strain through linen or calico."

Syn. Emulsion d'Amandes (*F.*), Mandelmilch (*G.*), Latte di Mandorle (*I.*).

In these preparations the oil of the almonds is diffused through the water, and suspended in it by the mucilage and fecula which the almonds contain. The confection affords an expeditious mode of making the mixture. The use of distilled water is an unnecessary refinement. Bitter almonds are sometimes employed instead of sweet; and as hydrocyanic acid is evolved by water in the bitter almond, its emulsion is a direct sedative, and may be employed for this purpose; in some habits, however, owing to idiosyncracy, bitter almonds cannot be administered without producing an eruption on the skin, and otherwise disordering the system, — an effect depending probably on some other ingredient than the hydrocyanic acid.

Qualities. — These emulsions are inodorous, bland, milky-looking fluids. The oil, after some time, rises like a thick cream to the surface; and in forty-eight hours the acetous fermentation often commences, and the mixtures become sour. They are decomposed by acids, oxymel of squills, spirits, and tinctures (unless these be in small quantity), tartrate and bitartrate of potassa, bisulphate of potassa, nitrate of potassa, acetate and diacetate of lead, and

sweet spirit of nitric ether, which are therefore incompatible in prescriptions with almond emulsions.

Medical properties and uses. — These mixtures are in common use as diluents and demulcents in inflammatory fevers, strangury, dysury, and other affections of the urinary organs; but they are chiefly useful as pleasant vehicles for the exhibition of more active remedies. The dose is from f ℥ ij. to Oss., frequently repeated.

MISTURA AMMONIACI, Lond. Dub. *Mixture of Ammoniacum.*

"Take of prepared ammoniacum, *five drachms;* distilled water, *a pint.* Rub the ammoniacum with the water, gradually added, until they are perfectly mixed."

Dublin.

"Take of gum ammoniac, *two drachms;* water, *eight ounces.* Triturate the gum with the water, gradually added, until the mixture assumes the appearance of milk, then strain through muslin."

The resinous part of the ammoniacum is suspended in the water by means of the gummy part; but after a little time the greater portion of the resin subsides. It is coagulated by distilled vinegar, the oxymels, ether, spirit of nitric ether, bitartrate of potassa, and bichloride of mercury, which are therefore incompatible in prescriptions with mixture of ammoniacum. It is advantageously employed as an expectorant in doses of from f ℥ ss. to f ℥ j., combined with an equal quantity of almond mixture.

MISTURA CAMPHORÆ, Lond. Edin. Dub. *Mixture of Camphor.*

"Take of camphor, *half a drachm;* rectified spirit, *ten minims;* distilled water, *a pint.* First rub the camphor with the spirit, then add the water gradually, and strain through linen."

Edinburgh.

"Take of camphor, *one scruple;* sweet almonds and pure sugar, of each, *half an ounce;* water, *one pint.* Steep the almonds in hot water, and peel them; rub the camphor and sugar well together in a mortar; add the almonds; beat the whole into a smooth pulp; add the water gradually, with constant stirring; and then strain."

Dublin.

"Take of tincture of camphor, *one fluid ounce;* water, *three pints.* Shake the tincture and water together in a bottle, and, after the mixture has stood for twenty-four hours, filter through paper." [1]

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[1] A preparation under the name of *Mistura Camphoræ concentrata* is kept by many druggists for making camphor mixture, by adding f ʒ iv. of it to f ʒ xvj. of pure water.

MISTURA CAMPHORÆ CUM MAGNESIA, Edin. *Mixture of Camphor with Magnesia.*

"Take of camphor, *ten grains;* carbonate of magnesia, *twenty-five grains;* water, *six fluid ounces.* Triturate the camphor and carbonate of magnesia together, adding the water gradually."

Syn. Mixture Camphré (*F.*), Kampfermixtur (*G.*), Mistura Canforata (*I.*).

A pint of water takes up a scruple of camphor, or one grain to each ounce: and the camphor communicates both odour and taste to the water in a considerable degree: it is rendered more soluble by the magnesia. Solution of pure potassa separates the camphor. Camphor mixture is an elegant vehicle for more active remedies in low fevers and nervous affections; but cannot be regarded as acting on the habit from the quantity of camphor it contains. The dose is from f℥j. to f℥ij., given every three or four hours.

In the preparation of the Edinburgh College the whole of the camphor is diffused through the mixture; the medicinal powers of which are consequently more considerable than those of the London and Dublin preparations. It is less apt to excite nausea and uneasiness at the stomach than camphor in powder, and it is given with advantage in typhus and nervous cases, in doses of f℥ij. every three or four hours.

MISTURA CREASOTI, Edin. *Mixture of Creasote.*

"Take of creasote and acetic acid, of each, *sixteen minims;* compound spirit of juniper, and syrup, of each, *one fluid ounce;* water, *fourteen fluid ounces.* Mix the creasote with the acid, then gradually add the water, and lastly the syrup and spirit."

This is a convenient form for general use. The dose is f℥jss.

MISTURÆ CRETÆ, Lond. Edin. Dub. *Mixture of Chalk.*

"Take of prepared chalk, *half an ounce;* sugar, *three drachms;* mixture of acacia, *a fluid ounce and a half;* cinnamon water, *eighteen fluid ounces.* Mix."

Edinburgh.

"Take of prepared chalk, *ten drachms;* pure sugar, *five drachms;* mucilage, *three fluid ounces;* spirit of cinnamon, *two ounces;* water, *two pints.* Triturate the chalk, sugar, and mucilage together, and then add, gradually, the water and spirit of cinnamon."

It is prepared by decolorizing f℥iij. of tincture of myrrh, by means of ℥j. of animal charcoal, digesting the mixture for fourteen days and then filtering. The concentrated mixture is made with f℥iij. of the tincture of camphor, P. L. ♏xxx. of the decolorized tincture, and f℥iv. of rectified spirit. The camphor mixture made with this solution contains 0·76 of a grain in each fluid ounce. — *Pharm. Journ.* vol. ii. p. 408.

Dublin.

"Take of prepared chalk, *two drachms;* simple syrup, mucilage of gum arabic, of each, *half a fluid ounce;* cinnamon water, *seven fluid ounces.* Rub the chalk with the cinnamon water; then add the syrup and mucilage, and mix."

These are common and useful forms of giving chalk in acidity of the primæ viæ: and, combined with opium or catechu, in diarrhœa. The dose is from f ℥ j. to f ℥ ij., given every three or four hours, or after every liquid evacuation.

MISTURA FERRI COMPOSITA, Lond.[1] Edin. Dub. *Compound Mixture of Iron.*

"Take of powdered myrrh, *two drachms;* carbonate of potassa, *a drachm;* rose-water, *eighteen fluid ounces;* powdered sulphate of iron, *two scruples and a half;* spirit of nutmeg, *a fluid ounce;* sugar, *two drachms.* Rub together the myrrh, the carbonate of potassa, and the spirit of nutmeg; while rubbing, add first the rose-water with the sugar, then the sulphate. Put the mixture immediately into a glass vessel, and stop it." (Preserve it in well-closed bottles, *E.*)

Dublin.

"Take of myrrh, in powder, *one drachm;* pure carbonate of potash, *half a drachm;* essence of nutmeg, *one fluid drachm;* rose-water, *eight fluid ounces;* refined sugar, *one drachm*; sulphate of iron, *half a drachm.* Triturate the myrrh and carbonate of potash with the sugar, essence of nutmeg, and seven ounces of the rose-water, the latter being gradually added, until a uniform mixture is obtained; to this add the sulphate of iron, previously dissolved in the remaining ounce of rose-water, and enclose the mixture at once in a bottle, which should be tightly corked."

In this mixture the sulphate of iron is decomposed by the carbonate of potassa forming, by the change of constituents which takes place, sulphate of potassa and carbonate of iron; the former of which is dissolved, while the latter is diffused through the mixture, and kept suspended by the myrrh, which forms a saponaceo-mucilaginous compound with the excess of alkali. The iron, which is in the state of a carbonate, rapidly attracts oxygen while the vessel is opened, and loses its carbonic acid, being wholly converted into the sesquioxide, which is insoluble, and, consequently, it is necessary to keep the mixture excluded from the air; or rather, it should not be kept prepared.

Medical properties and uses.—This mixture, which is nearly the same as the celebrated antihectic mixture of Dr. Griffith, is a

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[1] This name is certainly improper; but it is not easy to invent one which would be descriptive of the compound, and yet be sufficiently concise: *mistura carbonatis ferri cum myrrha* would have been less objectionable.

useful tonic in all cases in which preparations of iron are indicated, particularly in hysteria and chlorosis, and in phthisis, when no active inflammatory diathesis is present. The dose is from f ℥ j. to f ℥ ij., given two or three times in a day.

MISTURA FERRI AROMATICA, Dub. *Aromatic Mixture of Iron.*

"Take of Peruvian bark (crown or pale), in powder, *one ounce;* calumba root, in coarse powder, *three drachms;* bruised cloves, *two drachms;* iron filings, separated by a magnet, *half an ounce.* Digest for three days, with occasional agitation, in a covered vessel, with as much peppermint-water as will give twelve ounces of a filtered product, and then add, of compound tincture of cardamoms, *three ounces;* tincture of orange-peel, *three fluid drachms.* This mixture should be kept in a well-stopped bottle."

The iron is in the state of tannate and kinate. The mixture was originally employed under the name of Heberden's Ink, Atramentum Heberdenii. It appears to me to be a very unnecessary admixture of bitters and aromatics. Dose, ℥ j. to ℥ ij. Not much used.

MISTURA GENTIANÆ COMPOSITA, Lond. *Compound Mixture of Gentian.*

"Take of compound infusion of gentian, *twelve fluid ounces;* compound infusion of senna, *six fluid ounces;* compound tincture of cardamoms, *two fluid ounces.* Mix."

This combination is useful in atonic dyspepsia, in which the bowels generally require assistance; but a permanent formula of this kind is unnecessary, as the quantity of the purgative requires to be varied according to circumstances. Dose, f ℥ j. to f ℥ ij. or more.

MISTURA GUAIACI, Lond. Edin. *Mixture of Guaiacum.*

"Take of powdered guaiacum, *three drachms;* sugar, *half an ounce;* powdered acacia, *two drachms;* cinnamon water, *a pint.* Rub the guaiacum with the sugar and acacia, and to these, while rubbing, add gradually the cinnamon water."

Edinburgh.

"Take of guaiac, *three drachms;* sugar, *half an ounce;* mucilage, *half a fluid ounce;* cinnamon water, *nineteen fluid ounces and a half.* Triturate the guaiac with the sugar, then with the mucilage, and then add gradually the cinnamon water, with constant trituration."

This is a convenient mode of exhibiting guaiacum. It is given in doses of from f ℥ ss. to f ℥ ij., two or three times a day; diluting freely with tepid barley-water or gruel to assist its operation.

MISTURA HORDEI, Edin. *Mixture of Barley.* See *Decoctum Hordei.*

MISTURA SCAMMONII, Edin. *Mixture of Scammony.*

"Take of resin of scammony, *seven grains;* unskimmed milk, *three fluid ounces.* Triturate the resin with a little of the milk, and gradually with the rest of it, until a uniform emulsion is formed."

This is a mode of administering scammony in a fluid form; but no advantage is derived from it. One half may be taken for a dose.

MISTURA SPIRITUS VINI GALLICI, Lond. *Mixture of French Brandy.*

"Take of spirit of French wine (brandy), cinnamon-water, each, *four fluid ounces;* the yolks of two eggs; sugar, *half an ounce;* oil of cinnamon, *two minims.* Mix."

This is undoubtedly one of the most agreeable preparations in the Pharmacopœia; and, certainly, not one of the least useful. It is a pleasant and beneficial stimulant in the sinking stage of low fevers.

MUCILAGINES.

MUCILAGES.

MUCILAGES, correctly speaking, are simple solutions of gum or mucus in water; but the term mucilage, in pharmaceutical language, implies also any solution of a thick and adhesive nature, resembling in its appearance the solutions of gum.

MUCILAGO, Edin. *Mucilage.* See *Mistura Acaciæ.*

MUCILAGO ACACIÆ, Dub. *Mucilage of Acaciæ.* See *Mistura Acaciæ.*

MUCILAGO TRAGACANTHÆ, Edin. *Mucilage of Tragacanth.*

"Take of tragacanth, *two drachms;* boiling water, *nine fluid ounces.* Macerate for twenty-four hours, then triturate to dissolve the gum, and strain through linen or calico."

Syn. Mucilage de Gomme Adraganthe (*F.*), Schlieim de Traganth (*G.*), Mucilagine di Gomma Adragante (*I.*).

Tragacanth, treated in this manner, forms a thick, soft, very viscid mucilage, but the diffusion in the water is not uniform;

nor does it become so even when boiled. The water separates from the tragacanth, on standing; and this separation is increased, if mucilage of gum be mixed with the tragacanth. It may be used in the same cases as mucilage of gum arabic; and has been recommended by M. Blaire, a French surgeon, as a remedy in burns. He directs linen rags, or bibulous paper, soaked in the mucilage, to be applied over the affected part, which must be also kept moist with the mucilage for some days.[1] It is chiefly employed for making pills and troches.

MUCILAGO AMYLI, Edin. Dub. *Mucilage of Starch.*

"Take of starch, *half an ounce;* water, *one pint.* Triturate the starch with a little of the water; add the rest of the water gradually; then boil for a few minutes."

Dublin.

"Take of starch, *half an ounce;* water, *half a pint.* Triturate the starch with the water, gradually added, then boil for a few minutes."

Starch, thus treated, forms a strong, insipid, inodorous, opaline-coloured, gelatinous mucilage. In cases of phthisis, hectic fever, and abrasions of the stomach, it is given as a demulcent by the mouth; but it is more generally and more advantageously exhibited in the form of enema in diarrhœa, dysentery, and abrasions of the rectum. It is the common vehicle for exhibiting opium in the form of enema.

MUCILAGO HORDEI, Dub. *Mucilage of Barley.*

"Take of ground pearl barley, *half an ounce;* water, *sixteen ounces.* Triturate the barley with the water gradually added, then boil for a few minutes."

This preparation resembles very closely the *Decoctum Hordei.*

OLEA DISTILLATA.

DISTILLED, *or* VOLATILE OILS.

VOLATILE OILS, as they are properly denominated by the Edinburgh College, are vegetable products, found in almost every part of many plants, except the cotyledons of the seeds, in which, almost always, the fixed oils are contained. In some plants, the volatile

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[1] Vide *London Med. Repository,* vol. iii. p. 257.

oil exists in distinct cells, as, for instance, the vittæ in the fruit of the umbelliferæ, and the vesicles on the rind of the orange and the lemon. It is sometimes obtained by simple expression, but in general it can only be obtained by distillation; whence the name *distilled oils*, given to this class of substances by the London College: and as the odour of plants generally depends on their volatile oils, the Dublin College, following the example of the elder chemists, who denominated them essences, have adopted the term *essential oils.* The expressed volatile oils are now rejected from the Pharmacopœias; and the whole of those used in pharmacy, retained, are procured by distillation. In the London Pharmacopœia these oils are now placed in the list of the Materia Medica.

Volatile oil is obtained from both recent and dried plants. When fresh plants are to be employed, they require no previous treatment; but when the plants are dry, or when woods or barks are to be employed, the substances must be macerated in salt and water for some time, and the woods and barks be previously rasped. The distillation is performed in the following manner: — The plants, or the parts of them containing the oil, are to be put into a tinned copper still, and closely pressed down; after which, as much water is to be poured in as will be sufficient to cover the materials. The head of the still, which should be low, is then to be luted on; the fire lighted, and so regulated as to keep the contents of the still scarcely up to the boiling point; and the distillation should be continued, until the condensed vapour comes over nearly insipid and inodorous. During this process the volatile oil rises with the watery vapour, from which, however, the greater part of it again separates, after it has remained at rest for some hours in a cool place, and either floats on the surface of the water, or sinks to the bottom, according to its specific gravity. The complete separation of the oil is effected by an instrument called a Separator (see Part I.): and the water is to be again used for a second distillation of fresh materials, by which, as it is already impregnated with as much of the oil as it can dissolve, the product of oil of the second and every subsequent distillation will be consequently greater than that of the first; but it is not until "the tenth distillation, in some cases, that the product attains its maximum."[1] By the same process, volatile oils are obtained from balsams, resins, gum resins, and turpentines. These oils have not their characteristic qualities in perfection immediately after their distillation, but have a disagreeable, empyreumatic odour; to dissipate which they must be allowed to stand for some days in vessels loosely covered with paper, before they be put into the bottles in which they are to be preserved. These bottles should be opaque.

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[1] *Aikin's Dictionary of Chemistry*, art *Oil.*

Although all volatile oils agree in their chemical properties sufficiently to constitute them members of the same class of substances, yet they differ greatly in their qualities from each other, and in the proportions in which they are obtained.

Volatile oils have a penetrating odour, and hot taste. They are completely evaporated when heated in the open air; a property which is taken advantage of as a test of their purity; for if they be adulterated with fixed oil, which is not unfrequently the case, by heating a small portion of the oil on a piece of clean paper a greasy spot will remain, whereas, if the volatile oil be pure, the paper will be left perfectly clean. In a higher temperature, volatile oils are readily ignited, and burn with a bright white flame, emitting a large quantity of black dense smoke; and with the production of a large proportion of carbonic acid and water.

Volatile oils, exposed to the light, are either deepened in colour or they become colourless; when exposed to the air they become more viscid, less odorous, redden the tincture of turnsole, and gradually assume the form of resins; which changes Dr. Priestley ascertained [1] to depend upon the absorption of oxygen; and hence the necessity of preserving volatile oils in small phials, full, and well corked. An oil which has become thick and scentless may be rectified by re-distilling it with some of the same kind of plant from which it was originally extracted, or with alcohol or sulphuric ether [2]; a limpid, odorous oil comes over; and resin remains in the retort.

These oils are very sparingly soluble in water, rendering it milky when agitated with it: they communicate to it their odour: they are all soluble in alcohol, ether, and the fixed oils in various proportions. From their solubility in alcohol they are sometimes adulterated with that fluid; but the fraud may be detected by agitating some of the suspected oil with water; when, if the oil contain alcohol, an increase of temperature will be indicated by the thermometer, but not if the oil be pure.[3] One of the best, and the easiest mode of detecting the presence of spirit was proposed by M. Borsarelli. He advises a tube to be filled two-thirds full of the suspected oil, and to introduce into it several small pieces of dry chloride of calcium, applying a heat of 212° for four or five minutes, shaking the tube occasionally, and ultimately leaving it to cool slowly. If the oil contains any alcohol it will dissolve the chloride, which will remain in a fluid form at the bottom of the tube, distinct from the oil. If the quantity of alcohol be very small, the chloride will appear as if effloresced at the bottom of the tube; and if no alcohol be present it will undergo no change. The chloride

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[1] *Priestley on Air*, ii. 232. [2] *Nicholson's Journal*, 8vo. vii. 6.
[3] Marqueron, *Annales de Chimie*, xlviii. 267.

must be used in small portions at first, and afterwards gradually added, in order to prevent the alcohol, if in small quantity, from being wholly absorbed by the chloride, without effecting any apparent change upon it. The more expensive oils are also occasionally adulterated with the cheaper, particularly with oil of turpentine, which, however, is readily discovered by its peculiar odour, if a piece of paper be dipped in the suspected oil and dried with a gentle heat. They are also, sometimes, adulterated with castor oil; and as the mixture, when the ingredients are in equal proportions, is soluble in alcohol, the fraud cannot be detected by that test; but it is rendered obvious by the adulterated oil leaving a greasy stain upon clean white paper, which has been touched with it, and held before the fire, whereas no stain is left by the genuine oil.

Volatile oils unite with sulphur, in a temperature sufficient to melt the sulphur, and form brown-coloured, fetid mixtures, which have been denominated *balsams of sulphur*. They also unite with iodine, forming thick, brown, sometimes viscid compounds. The terebinthinate oils poured on iodine cause the evolution of much heat, and sometimes the mixture breaks into a flame. The alkalies and earths combine imperfectly with them, and constitute a class of bodies, which the French chemists have denominated *savonules*. The action of the acids is much more violent on them than on the fixed oils: and several of them detonate when rubbed with *chlorate* of potassa.

As medical agents, volatile oils are stimulant and aromatic. They are chiefly employed to remove nausea and flatulence, to correct the griping qualities of some purgatives, and the disagreeable taste of other remedies. They may be given, triturated with water and mucilage; or dropped first on a lump of sugar, and through its medium diffused in water, forming a solution denominated *oleum saccharum*. The quantity of sugar must be more than ten times the weight of the oil; and when they are well triturated together, the oil becomes thus completely soluble and is retained in solution in the water, and may be diluted to any extent.

Some of the more stimulant of these oils are added to embrocations to be used as rubefacients, where counter-irritation is necessary.

The London College have now placed the volatile oils in the list of the Materia Medica. The Edinburgh and Dublin Colleges give the following general rules for their preparation: —

OLEA VOLATILIA, Edin.

Volatile Oils.

"Volatile oils are obtained chiefly from the flowers, leaves, fruits, barks, and roots of plants, by distilling them with water, in which they have been allowed to macerate for some time. In order to obtain these oils profitably and of good quality a great variety of conditions must be attended to, differing in regard to each, and such as it would be out of place to enumerate here in detail. Certain general principles, however, may be mentioned.

Flowers, leaves, and fruits generally yield the finest oils, and in greatest quantity, when they are used fresh. Many, however, answer, equally well, if they have been preserved by beating them into a pulp with about twice their weight of muriate of soda, and keeping the mixture in well-closed vessels.

Substances yielding volatile oils must be distilled with water, the proper proportion of which varies for each article, and for the several qualities of each. In all instances the quantity must be such as to prevent any of the material from being empyreumatized before the whole oil is carried over. In operations where the material is of pulpy consistence, other contrivances must be resorted to for the same purpose. These chiefly consist of particular modes of applying heat so as to maintain a regulated temperature not much above 212°. On the small scale heat may be thus conveniently applied by means of a bath of a strong solution of muriate of lime, or by means of an oil-bath, kept at a stationary temperature with the aid of a thermometer. On the large scale heat is often applied by means of steam under regulated pressure. In other operations it is found sufficient to hang the material within the still in a cage or bag of fine net-work; and sometimes the material is not mingled with the water at all, but is subjected to a current of steam passing through it.

The best mode of collecting the oil is by means of the refrigeratory (see Part I.); from which the water and oil drop together into a tall narrow vessel provided with a lateral tube or lip near the top, and another tube rising from the bottom to about a quarter of an inch below the level of the former. It is evident that with a receiver of this construction the water will escape by the lower tube; while the volatile oil, as it accumulates, will be discharged by the upper one, except in the very few instances where the oil is heavier than water.

By attending to the generel principles now explained, volatile oils may be readily obtained of excellent quality from the flowers of

ANTHEMIS NOBILIS,
LAVANDULA VERA, and
RUTA GRAVEOLENS;

From the fruit of

ANETHUM GRAVEOLENS, bruised,
CARUM CARUI, bruised,
EUGENIA PIMENTO, bruised,
FŒNICULUM OFFICINALE, bruised,
JUNIPERUS COMMUNIS, bruised,
PIPER CUBEBA, ground, and
PIMPINELLA ANISUM, ground;

From the undeveloped dried flowers of

CARYOPHYLLUS AROMATICUS;

From the tops of

JUNIPERUS SABINA, and
ROSMARINUS OFFICINALIS;

From the entire herb of

MENTHA PIPERITA,
MENTHA PULEGIUM,
MENTHA VIRIDIS, and
ORIGANUM MARJORANA;

And also from the bruised root of

SASSAFRAS OFFICINALE."

OILS, Dublin.

"*The Volatile or Essential Oils* may be obtained by the following general process. The substance from which the oil is to be extracted is macerated for twenty-four hours, with five times its weight of water, in a sheet-tin or copper still, and, a condenser being then attached, half the water is drawn over by distillation, on the surface of which the oil will be found to float, unless (which is rarely the case) it should be heavier than water, when it will be found at the bottom of the receiver. The oil having been separated, the aqueous product, which is a saturated solution of the oil in water, is to be returned to the still, and the distillation resumed and continued till the resulting liquid has the same volume as before. The oil is again separated, the watery product returned to the still, and the distillation resumed; and this process is to be repeated until it ceases to afford any additional oily product. The oil thus obtained is to be separated as completely as possible from water, and preserved in a well-stopped bottle.

In this way volatile oils may be obtained from the entire herb of

MENTHA PIPERITA,
MENTHA PULEGIUM,
MENTHA VIRIDIS;

From the seeds or fruit of

CARUM CARUI,
CUBEBA OFFICINALIS,
EUGENIA PIMENTA,
FŒNICULUM OFFICINALE,
JUNIPERUS COMMUNIS,
MYRISTICA MOSCHATA,
PIMPINELLA ANISUM;

From the flowers of

ANTHEMIS NOBILIS,
LAVANDULA VERA;

From the undeveloped dried flowers of

CARYOPHYLLUS AROMATICUS;

From the tops of

JUNIPERUS SABINA,
ROSMARINUS OFFICINALIS;

From the bark of

CINNAMOMUM ZEYLANICUM.

The water distilled over in the preparation of the several oils should be preserved for medical use."

OLEUM ANETHI, Edin. *Oil of Dill.*

About two pounds of this oil are obtained from 1 cwt. of the fruit. It occurs as a pale yellow oil, sp. gr. 0·881, having the odour of the fruit and a hot pungent taste.

Medical properties and uses. — Used as a carminative and stomachic chiefly in the flatulent colic of infants, and in hiccup. Dose ♏ j. to ♏ v.

OLEUM ANISI, Edin. Dub. *Oil of Anise.*

Syn. Huile d'Anis (*F.*), Anisöhl (*G.*), Olio dei Anice (*I.*).

This oil, which is contained in the pericarp of the fruit of the anise, is of a whitish, or a pale straw-colour; it has the odour of the fruit, and a slightly pungent, bitter, sweetish taste. It crystallises at 50° in flat tables. It is sometimes adulterated with wax, spermaceti, or camphor: but the fraud is easily detected; for on moderately warming the genuine oil the crystals dissolve, which is not the case with the sophisticated.[1] The greater part of

[1] Baumé.

the oil of anise-seed consumed in this country is prepared in Spain. The specific gravity of that made in England is ·9768; of that imported, or the foreign, ·9903. It is a compound of 75 per cent. of eleoptine + 25 of stearoptine: it is the latter which solidifies.

Medical properties and uses. — This oil is used chiefly as a carminative; and, as it is less pungent than many of the other volatile oils, it is better adapted for relieving flatulence in children. It is given in doses of from ♏ v. to ♏ xv., triturated with sugar.

OLEUM ANTHEMIDIS, Edin. Dub. *Oil of Chamomile.*

Syn. Huile de Camomille Romaine (*F.*), Kamillenöhl (*G.*), Olio di Camamilla Romana (*I.*), Azeyte de Manganella de Botera (*S.*).

The odour of this oil is unpleasant, and the taste pungent. When recently distilled the colour is cerulean blue; but by exposure to light and by age it changes to yellow. The spec. grav. of the English oil, from the flowers only, is ·9083, of the foreign it is ·9289.

Medical properties and uses. — This oil is supposed to possess antispasmodic powers, and is therefore sometimes recommended in cramp of the stomach, and as an adjunct to purgative pills. The dose is from ♏ v. to ♏ xj.; but it is seldom used.

OLEUM CARUI, Edin. Dub. *Oil of Carraway.*

Syn. Huile de Carvi (*F.*), Kümmelöhl (*G.*), Olio di Carvi (*I.*), Azeyte de Alcorovea (*S.*).

This oil has an aromatic odour, and a sweetish, pungent taste; is of a yellow colour. Its specific gravity is ·946.[1] Mr. Brande says ·9310.[2]

Medical properties and uses. — Oil of carraway is stimulant and carminative. It is chiefly used as an adjunct to purgative pills, and to cover the disagreeable flavour of other substances.

The dose is from ♏ j. to ♏ x.

OLEUM CARYOPHYLLI, Edin. Dub. *Oil of Cloves.*

Its properties and composition are described under *Caryophyllus Aromaticus*, Part II. About a pound of this oil is obtained from seven to nine pounds of cloves.[3]

OLEUM CINNAMOMI, Dub. *Oil of Cinnamon.*

This oil, as met with in commerce, differs much in colour, and has a complex composition. According to the Edinburgh College, it is "cherry-red when old, wine-yellow when recent: odour

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[1] Baumé. [2] *Manual*, p. 342. [3] *United States Dispensatory.*

purely cinnamomic; nitric acid converts it nearly into a uniform crystalline mass." Cinnamon oil has a specific gravity of about 1·035. It consists essentially of a body named *Hydruret of Cinnamyle* ($C_{18} H_8 O_2$), which, by exposure, loses an equivalent of hydrogen and acquires one of oxygen, by which means it is converted into *cinnamomic acid* ($C_{18} H_7 O_3$), a crystalline body, resembling very much benzoic acid, and, like that body, converted into hippuric acid by passing through the system. This acid is always contained in the oil of cinnamon of commerce, in varying proportions, depending on age and exposure. Nitric acid and ammonia form, with the hydruret of cinnamyle, crystalline compounds.

Medical properties and uses. — A very powerful stimulant, used for the same purposes as the bark. (See *Laurus Cinnamomi*, Part II.) Dose ♏ j. to ♏ iij. and upwards.

OLEUM COPAIBÆ, Edin. *Oil of Copaiva.*

"Take of copaiva, *one ounce;* water, *one pint and a half.* Distil, preserving the water; when most of the water has passed over, heat it, return it into the still, and resume the distillation: repeat this process so long as a sensible quantity of oil passes over with the water."

The properties of this oil are described under *Copaiba*, Part II. Use the same as the Balsam. Dose, ♏ v. to ♏ xxx.

OLEUM FŒNICULI OFFICINALIS, Edin. Dub. *Oil of Fennel.*

Syn. Huile essentiale de Fenoule (*F.*), Fenchelöhl (*G.*), Olio di Finoichio (*I.*), Azey de l' Eneldo hinojo (*S.*).

Seventy-five pounds of fennel-fruit yield thirty ounces of oil [1], which is colourless, and congeals at 50°. It has the odour of the plant; and a hot, sweetish taste. Its specific gravity is ·997.[2]

Medical properties and uses. — The same as those of the plant: the usual dose is from ♏ ij. to ♏ xx. It is rarely used.

OLEUM JUNIPERI, Edin. Dub. *Oil of Juniper.*

Syn. Huile essentiale de Genevrier (*F.*), Wachholder beeröhl (*G.*), Olio di Ginepro (*I.*).

Forty-eight pounds of the bruised fruit of German junipers yield six ounces of oil[3], of a specific gravity ·611, according to Lewis; but Mr. Brande states that of the English junipers to be ·8688, the foreign ·8834.[4] As the oil is contained in the vittæ of the nut, it is necessary to bruise the fruit. Its odour is similar

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[1] Dehne. [2] Lewis. [3] Dehne. [4] Lewis.

to that of turpentine, and the taste hot and acrid. It has a greenish-yellow colour, is viscid, and deposits a feculent matter when long kept. When genuine it is soluble in alcohol. In composition it is analogous to oil of turpentine, its formula being C_{10} H_8, or C_{20} H_{16}.

Medical properties and uses. — This oil is carminative, diaphoretic, diuretic. It is sometimes given in dropsy, and may be added to fox-glove when it is exhibited in the form of pills. The dose is from ♏ ij. to ♏ x., combined with water by means of sugar or of mucilage. It is the best mode of giving juniper.

OLEUM LAVANDULÆ VERÆ, Edin. Dub. *Oil of Lavender.*

Syn. Huile essentiale de Lavande (*F.*), Lavendelöhl (*G.*), Olio di Lavanda (*I.*), Azeyte de l' Espliego (*S.*).

One pound nine ounces of this oil are obtained from eighty pounds of lavender flowers. The odour is very fragrant, and the taste warm and agreeable. Its colour is a very pale, lemon-yellow: its specific gravity, according to Lewis, is ·936[1]; but Mr. Brande says, that the specific gravity of oil obtained from the flowers only is ·8960; that from the whole herb ·9206. It is a compound of C^{15} H^{14} O^2. ([2])

Medical properties and uses. — This oil is stimulant and cordial. It is chiefly used in hysteria and nervous headache, in doses of from ♏ ij. to ♏ v., given on a lump of sugar.

OLEUM MENTHÆ PIPERITÆ, Edin. Dub. *Oil of Peppermint.*

Syn. Huile essentiale de Menthe poivrée (*F.*), Pfeffermünzöhl (*G.*), Olio di Menta piperitide (*I.*).

Four pounds of the recent plant yield from one drachm and a half to three drachms and a half of this oil.[3] Its odour is strong, and its taste very pungent, at the same time it impresses a sensation of coldness upon the tongue. Its colour is brownish-yellow, becoming white when exposed to the light. Its spec. grav. is ·902. It is a compound of C^{21} H^{20} O^2. ([4])

Medical properties and uses. — Oil of peppermint is stimulant and carminative, useful in cramp of the stomach, flatulent colic, and anorexia, rubbed up with sugar or mucilage.[5] The dose is from ♏ j. to ♏ iij.

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[1] Dehne. [2] Kane. [3] Baumé. [4] Kane.

[5] Peppermint drops or lozenges are a mixture of starch, sugar, mucilage of tragacanth, and oil of peppermint.

OLEUM MENTHÆ VIRIDIS, Edin. Dub. *Oil of Spearmint.*

Syn. Huile essentiale de Baume verte (*F.*).

This oil has a flavour similar to, but less grateful than, that of peppermint: its taste is warm and less pungent than that of peppermint. According to Lewis, its specific gravity is ·975.[1] Mr. Brande states it to be ·9394. Its colour is greenish. Its composition, according to Dr. Kane, is $C^{33}\ H^{28}\ O$.

Medical properties and uses. — The same as those of oil of peppermint. The dose is from ♏ ij. to ♏ v.

OLEUM MENTHÆ PULEGII, Edin. Dub. *Oil of Pennyroyal.*

Syn. Huile essentiale de Menthe Peuliot (*F.*), Poleiohl (*G.*), Olio di Puleggio (*I.*), Azeyte de Peleo (*S.*).

This oil is of a reddish-yellow colour, and resembles in its other qualities the oil of peppermint. Its spec. grav., according to Lewis, is ·978; according to Mr. Brande, ·9390. Dr. Kane regards it as a compound of $C^{10}\ H^{8}\ O$.

Medical properties and uses.—It is stimulant and antispasmodic, but is seldom used. The dose may be from ♏ j. to ♏ v., given on a lump of sugar.

OLEUM MYRISTICÆ MOSCHATÆ, Dub. *Volatile Oil of Nutmegs.*

For properties and composition, see *Myristica Moschata*, Part II.

Not often employed in medicine. It possesses all the active properties of the nutmeg.

OLEUM ORIGANI MARJORANÆ, Edin. *Oil of common Marjoram.*

Syn. Huile essentiale d' Origan (*F.*); Dostöhl (*G.*), Olio di Origano (*I.*), Azeyte de Origane Sylvestre (*S.*).

One hundred and fifty pounds of dried leaves of common marjoram yield fifteen ounces of oil[2], of a yellow colour, having the odour of the plant, and a hot acrid taste. Its specific gravity is ·940.[3] It is a compound of $C^{50}\ H^{40}\ O$.

Medical properties and uses. — On account of its acrimony, this oil is never exhibited internally. It is used to allay toothache;

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[1] Lewis. [2] Baumé. [3] Ibid.

two or three drops, on a piece of cotton, being put into the carious tooth.

OLEUM PIMENTÆ, Edin. Dub. *Oil of Pimento.*

Syn. Huile essentiale de Poivre de Jamaique (*F.*), Nelherpfefferöhl (*G.*), Olio di Pimento (*I.*).

This oil has the odour of the pimento, with its pungent taste in an increased degree. It is of a reddish-brown colour, is heavier than water, and its specific gravity 1·021. It consists of a heavy and light oil, and resembles very much that from the clove.

Medical properties and uses. — It has the same properties as allspice in a greater degree; and is given in dyspeptic affections, colic, and tympanitis, in doses of from ♏ iij. to ♏ v., rubbed with sugar, or in any proper vehicle.

OLEUM PIPERIS CUBEBÆ, Edin. Dub. *Oil of Cubebs.*

This oil has, usually, a greenish colour, but can be obtained colourless: it has the peculiar camphoraceous odour and taste of the fruit. Spec. grav. 0·929. Formula C_{10} H_8. (See *Piper Cubebæ,* Part II.)

Medical properties and uses. — The same as those of the fruit. Dose ♏ v. to ♏ xv., rubbed up with sugar and suspended in water.

OLEUM ROSMARINI, Edin. Dub. *Oil of Rosemary.*

Syn. Huile essentiale de Romarin (*F.*), Rosmarinöhl (*G.*), Olio di Rosmarino (*I.*).

Twenty-four pounds of the plant yield one ounce of a fluid colourless oil[1], the odour of which is less agreeable than that of the plant. It deposits crystals of camphor when long kept. Its specific gravity is ·9108.[2] According to Dr. Kane it consists of C^{44} H^{38} O^{2}.

Medical properties and uses. — It is stimulant; and frequently enters into the composition of liniments. The dose, as an internal remedy, may be from ♏ iij. to ♏ vj., but it is scarcely ever ordered.

OLEUM RUTÆ, Edin. *Oil of Rue.* Oil distilled from flowering plant.

Twenty-one pounds of rue yield fifty-nine grains of oil[3], which has the strong, ungrateful odour, and taste of the plant. When recently drawn, the colour of this oil is yellow; it deepens to a brown by age, and deposits a brownish, resinous sediment. Its sp. gr. is 0·837. It congeals at 40° of Fahrenheit. Its formula is C_{20} H_{14} O_3; it does not form a camphor with hydrochloric acid.

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[1] Baumé. [2] Ibid. [3] Ibid.

Medical properties and uses. — Oil of rue is stimulant and antispasmodic. It is sometimes given in hysteria, and in the convulsive affections of infants attendant on dentition; and is used as a rubefacient in palsy. The dose is from ♏ ij. to ♏ vj.

OLEUM JUNIPERI SABINÆ, Edin. Dub. *Oil of Savine.*

Syn. Huile essentiale de Sabine (*F.*), Sevenbaumöhl (*G.*), Olio di Sabina (*I.*), Azeyte de Enebrio Sabina (*S.*).

Two pounds of savine are said to yield five ounces of oil.[1] It is limpid, has the odour of the plant, and is extremely acrid to the taste. Its colour is yellow; but it becomes nearly colourless on being kept exposed to light. It is a hydrocarbonate, its formula being C^{10} H^{8}.

Medical properties and uses. — This oil is the principle on which the virtues of savine depend; hence it possesses the same properties, and is applicable to the same purposes, as the plant. The dose is from ♏ ij. to ♏ vj. triturated with sugar and any mucilaginous mixture.

OLEUM SASSAFRAS OFFICINALE, Edin. *Oil of Sassafras.*

Sixty pounds of bruised sassafras yield twelve ounces[2] of a viscid yellow oil, heavier than water, its specific gravity being 1·094.[3] Its odour is fragrant, and its taste hot and acrid, excoriating the lips when incautiously tasted. Nitric acid acts at first slowly, but afterwards violently, when it is added to this oil; sulphuric acts at once violently, white fumes are given off, and charcoal is left.

Medical properties and uses. — This oil is stimulant, and supposed to be also sudorific and diuretic. It is given in chronic rheumatism, and some cutaneous affections. The dose is from ♏ ij. to ♏ x., but it is scarcely ever ordered.

OLEUM TEREBINTHINÆ PURIFICATUM, Edin. *Rectified Oil of Turpentine.*

"Take of oil of turpentine, *one pint;* water, *four pints.* Distil as long as oil comes over with the water."

Syn. Huile essentiale de Térébenthine (*F.*), Terpenthinohl (*G.*), Olio di Trementina (*I.*), Azeyte de Pino (*S.*).

The chemical qualities and medicinal properties of oil of turpentine have been already noticed. (See PINUS, Part II.) The rectification of it is a troublesome process, and on account of the great inflammability of the vapours much caution is required to

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[1] Murray. [2] Baumé. [3] Ibid.

prevent them from escaping through the lutings of the vessel, and catching fire.

Qualities.—The rectified oil is a little lighter than the common oil, and completely free from any resinous admixture; it is colourless, limpid, and has a high refracting power. Its spec. grav., at 70°, is ·86; it boils at 314°; and congeals at + 14°. What remains in the retort is thick resinous matter, and is denominated balsam of turpentine.

Medical properties and uses.—These have been already mentioned (Part II.). I have had ample opportunity of ascertaining the efficacy of oil of turpentine as a remedy for tape-worm. In every case in which I have administered it the worm has been expelled, and the symptoms relieved. In general the animal has been voided dead, and of a livid hue; but in one instance, in which a portion of five feet in length was passed after two fluid ounces of the oil had been taken, it was not livid; and when voided, exhibited evident signs of animation. In no instance have I perceived that the large doses of the oil, which were taken for the above purpose, produced any particular effect on the urinary organs. The more usual sensible effects are temporary intoxication, accompanied with considerable nausea, and sometimes vomiting, which, after two or three alvine evacuations, subside, and leave a degree of langour for ten or twelve hours. The pain of the stomach and side, which is a usual concomitant of the disease, is always removed by the oil. I have also given this oil in combination with cinchona, with evident benefit, in rheumatism; particularly in that modification of the disease which attacks one side only of the head, and is periodical; the paroxysms generally coming once or twice in the twenty-four hours. Tincture of capsicum, in doses of ♏ iij., is a useful adjunct to the bark and turpentine in this affection. In some persons, however, turpentine greatly irritates the kidneys, producing pain and bloody urine, and in others its administration has produced a severe erythematic eruption over the body. These effects, however, are in some degree lessened by purifying the oil of turpentine by means of alcohol, as Dr. Nimmo suggests. To eight parts of the oil add "one part of alcohol, and agitate: on the mixture being left at rest the oil falls to the bottom, and the spirit holding the impurities in solution floats at the top. On repeating this process three or four times, pouring off the spirit each time, the oil is left nearly tasteless, and inodorous."[1] The dose in rheumatism is f ʒ j., repeated every four hours; but in tænia it may be given in doses of f ℥ j., combined with syrup of poppies, repeated every eight hours until the worm is expelled.

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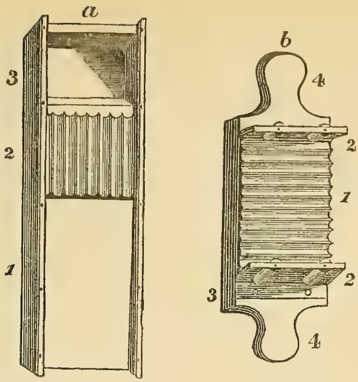
[1] *Journ. of Science*, vol. xiii. pp. 65, 66.

PILULÆ.

PILLS.

PILLS are masses of a consistence sufficient to preserve a round form, yet not so hard as to be of too difficult solution in the stomach. This form of preparation is particularly adapted for medicines which have a very nauseous taste or flavour, and such as operate in minute doses. Extracts, when not too hard, may be formed into pills without any addition; but more generally pills are composed of either vegetable, or earthy, or metallic powders, combined by means of syrup, or crumb of bread, or soap, or extract of liquorice, or treacle, or some conserve, into a coherent mass. Salts also may be formed into pills, except such as are deliquescent; and when efflorescent salts are used, they should be first freed from the water of crystallization, for the pills formed with uneffloresced salts are apt to fall into powder as they dry. The masses which are ordered to be kept prepared for the formation of pills require to be preserved in covered pots, wrapped in bladders, and occasionally moistened; and they are best made up with conserve of roses, which is less liable to become hard than any other ingredient. When the chief ingredient of the mass is resin, then rectified spirit should be used; and when this is used, the mass can always be again softened, should it become too hard, by means of a little spirit. When these masses are to be formed into pills, a given portion of the mass is rolled into a cylinder, the length of which is regulated by the number of pills into which it is to be divided; and the division is effected either as equally as possible by the hand, or by a machine invented for the purpose. This machine consists of two pieces. The first, *a*, is divided into three compartments; 1. a vacant space to receive the divided mass, which is to be rolled into pills; 2. a grooved brass plate, which assists in dividing the mass into pills; and 3. a box for containing a powder for covering the pills after they are formed. The second, *b*, consists, of a brass plate 1, grooved to match the plate 2 on piece *a*, and bounded at both ends by moveable projecting plates 2 2, containing two wheels under the ledge of the plate 2; and a wooden back 3, with two handles, 4 4, to which this plate is affixed. In using the machine the cylindrical mass is placed on 2 *a*; and divided by passing *b* over it, the wheels of *b*, enabling it to run easily, being applied to a brass plate which forms the margin of *a*.



After the round form is given to each of the pills, by rolling the divided pieces between the fingers, they are dropped into 3 *a*, and covered by some dried powder: as, for instance, carbonate of magnesia, or starch, or liquorice powder, to prevent them from adhering together. With the same intention pills were formerly, and in a few instances, are still gilded and silvered; but simple dry powders answer all the purposes of these coverings.

PILULÆ ALOES COMPOSITÆ[1], Lond. Dub. *Compound Aloetic Pills.*

"Take of Socotorine aloes, powdered, *an ounce;* extract of gentian, *half an ounce;* oil of caraway, *forty minims;* treacle, *a sufficient quantity.* Beat them together until they are incorporated into a mass fit to be formed into pills."

Dublin.

"Take of hepatic aloes, in powder, *two ounces;* extract of gentian, *one ounce;* oil of caraway, *one fluid drachm;* treacle, by weight, *one ounce.* Beat them together until they are thoroughly incorporated."

PILULÆ ALOES, Edin. *Pills of Aloes.*

"Take of Socotorine aloes and Castile soap, *equal parts;* conserve of red roses, *a sufficiency.* Beat them into a proper pill mass. This pill may be also correctly made with the finer qualities of East Indian aloes, as the Socotorine variety is very scarce; and many, not without reason, prefer the stronger Barbadoes aloes."

Syn. Pilules d'Aloë composée (*F.*), Pillole d'Aloë composte (*I.*).

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[1] The London College have now employed the singular number to express the name of the pill; we have used the plural for the sake of uniformity.

This is a useful pill: it is employed for obviating the habitual costiveness of the sedentary, and those of leucophlegmatic habits. The dose is from grs. x. to grs. xv. or more.

PILULÆ ALOES ET ASSAFŒTIDÆ, Edin. *Pills of Aloes and Assafœtida.*

"Take of aloes (Socotrine or East Indian), assafœtida, and Castile soap, *equal parts.* Beat them with conserve of red roses into a proper pill mass."

Syn. Pilules d'Aloë avec Assafœtida (*F.*), Pillole Aloetiche con Assafetida (*I.*).

These pills have been found extremely useful in dyspepsia attended with flatulence. The dose is grs. x., given twice a day.

PILULÆ ALOES ET FERRI, Edin. *Pills of Aloes and Iron.*

"Take of sulphate of iron, *three parts;* Barbadoes aloes, *two parts;* aromatic powder, *six parts;* conserve of red roses, *eight parts.* Pulverize the aloes and sulphate of iron separately; mix the whole ingredients, and beat them into a proper mass, which is to be divided into five-grain pills."

This is a useful and efficient tonic pill in chlorosis, hysteria, and amenorrhœa. It may be given in doses of two to three pills.

PILULÆ ALOES CUM MYRRHA, Lond. *Pills of Aloes with Myrrh.*

"Take of Socotorine or hepatic aloes, *half an ounce;* saffron, powdered myrrh, soft soap, of each, *two drachms;* treacle, *a sufficient quantity.* Beat them together, to form a mass."

Dublin.

"Take of hepatic aloes, in powder, *two ounces;* myrrh, in powder, *one ounce;* dried saffron, in powder, *half an ounce;* treacle, by weight, *two ounces and a half.* Triturate the aloes, myrrh and saffron together, and sift them; then add the treacle, and beat all the ingredients into a uniform mass."

PILULÆ ALOES ET MYRRHÆ, Edin. *Pills of Aloes and Myrrh.*

"Take of aloes (Socotorine or East Indian), *four parts;* myrrh, *two parts;* saffron, *one part.* Beat them into a proper mass with a sufficient quantity of conserve of red roses."

Syn. Pilules d'Aloë avec la Myrrhe (*F.*), Pillole Aloetiche con Mirra (*I.*).

These useful pills have been employed since the time of Rhazes, to stimulate and open the bowels in chloritic, hypochondriacal, and cachectic habits. The dose is from grs. x. to ℈ j., given twice a day.

PILULÆ ALOES CUM SAPONE, Lond. *Pills of Aloes with Soap.*

"Take of extract of Barbadoes aloes, in powder, soft soap, extract of liquorice, *equal parts;* treacle, *a sufficient quantity.* Incorporate the extract of aloes with the soap; then the rest being added, beat them all together to form a mass."

The soap increases the solubility of the aloes. Dose, grs. x. upwards.

PILULÆ ASSAFŒTIDÆ, Edin. *Assafœtida Pills.*

"Take of assafœtida, galbanum, and myrrh, of each, *three parts;* conserve of red roses, *four parts,* or *a sufficiency.* Mix, and beat them into a proper pill mass."

PILULÆ ASSAFŒTIDÆ COMPOSITÆ, Dub. *Compound Assafœtida Pills.*

"Take of assafœtida, *two ounces;* galbanum, myrrh, treacle, by weight, of each, *one ounce.* Heat all the ingredients in a capsule, by means of a steam or water bath, and stir the mass until it assumes a uniform consistence."

These pills are a useful combination of antispasmodics. Dose, grs. v. to grs. x.

PILULÆ CALOMELANOS COMPOSITÆ, Edin. Dub. Vide *Pilulæ Hydrargyri Chloridi Compositæ.*

PILULÆ CALOMELANOS ET OPII, Edin. *Pills of Calomel and Opium.*

"Take of calomel, *three parts;* opium, *one part;* conserve of red roses, *a sufficiency.* Beat them into a proper mass, which is to be divided into pills, each containing two grains of calomel."

PILULÆ CAMBOGIÆ COMPOSITÆ, Lond. *Compound Pills of Gamboge.*

"Take of gamboge, in powder, *two drachms;* aloes (Socotorine or hepatic), in powder, *three drachms;* ginger, in powder, *a drachm;* soft soap, *half an ounce.* Mix the powders together; then add the soap, and beat the whole together into a uniform mass."

PILULÆ CAMBOGIÆ, Edin. *Gamboge Pills.*

"Take of gamboge, East Indian or Barbadoes aloes, and aromatic powder, of each, *one part;* Castile soap, *two parts.* Pulverize the gamboge and aloes separately; mix all the powders; add the soap, and then a sufficiency of syrup; beat the whole into a proper pill mass."

These pills are considerably more active than the aloetic pills.

The dose is from grs. x. to ℈ j., given at bed-time in obstinate costiveness.

PILULÆ COLOCYNTHIDIS COMPOSITÆ, Lond.[1] Dub. *Compound Colocynth Pills.*

"Take of extract of colocynth, *a drachm;* extract of aloes, powdered, *six drachms;* scammony, in powder, *two drachms;* powdered cardamoms, *half a drachm;* soft soap, *a drachm and a half.* Mix the powders; then, the remaining ingredients being added, beat all together into a mass."

Dublin.

"Take of pulp of colocynth, in fine powder, *one ounce;* hepatic aloes, in fine powder, *two ounces;* scammony in fine powder, Castile soap, of each, *one ounce;* oil of cloves, *one fluid drachm;* treacle, by weight, *ten drachms.* Reduce the soap to a fine powder, and mix it with the colocynth, aloes, and scammony; then rub all together with the oil of cloves and treacle, and beat them into a mass of a uniform consistence."

PILULÆ COLOCYNTHIDIS, Edin. *Compound Colocynth Pills.*

"Take of Socotorine or Indian aloes, and scammony, of each, *eight parts;* colocynth, *four parts;* sulphate of potassa, oil of cloves, of each, *one part;* rectified spirit, *a sufficiency.* Beat the aloes, scammony, and sulphate together; mix with them the colocynth, previously reduced to fine powder; add the oil of cloves, and with the aid of a small quantity of rectified spirit beat the whole into a proper pill mass, which is to be divided into five-grain pills."

This pill is more powerful in its operation than any other aloetic pills; and it does not so soon lose its power when taken for any considerable length of time in habitual costiveness. Dose from grs. x. to grs. xv.

PILULÆ COLOCYNTHIDIS ET HYOSCYAMI, Edin. *Pills of Colocynth and Henbane.*

"Take of colocynth pill mass, *two parts;* extract of henbane, *one part.* Beat them well together, adding a few drops of rectified spirit, if necessary; and divide the mass into five-grain pills."

A useful purgative for those persons who have irritable bowels. Dose grs. x. upwards.

PILULÆ CONII COMPOSITÆ, Lond. *Compound Pills of Hemlock.*

[1] Extractum colocynthidis compositum, Ph. L. 1836.

"Take of extract of hemlock, *five drachms;* ipecacuanha, powdered, *a drachm;* treacle, *a sufficient quantity.* Beat them together into a mass."

A useful form of administering conium in conjuction with ipecacuanha in bronchitis, pertussis, and other pulmonary affections. The dose is from grs. v. to grs. vij.

PILULÆ CUPRI AMMONIATI, Edin. *Pills of Ammoniated Copper.*

"Take of ammoniated copper, in fine powder, *one part;* bread crumb, *six parts;* solution of carbonate of ammonia, *a sufficiency.* Beat them into a mass, and divide it into proper pills, containing each half a grain of ammoniated copper."

Syn. Pilules cuivreuses de Swédiaur (*F.*).

This is a convenient form for the exhibition of the ammonio-sulphate of copper, half a grain of which is contained in each of the pills. They are given in epilepsy and other spasmodic diseases. One pill, given night and morning, is sufficient at first; but the number may be gradually increased till five be taken for a dose.

PILULÆ DIGITALIS ET SCILLÆ, Edin. *Pills of Foxglove and Squill.*

"Take of digitalis and squill, of each, *one part;* aromatic electuary, *two parts.* Beat them into a proper mass with conserve of red roses; and divide the mass into four-grain pills."

It is supposed that the diuretic influence of foxglove is augmented by its combination with other diuretics; but this is more certainly attained by combining it with calomel.

PILULÆ FERRI CARBONATIS, Edin. *Pills of Carbonate of Iron.*

"Take of the saccharine carbonate of iron, *four parts;* conserve of red roses, *one part.* Beat them into a proper mass; to be divided into five-grain pills."

This pill is apt to become extremely hard and insoluble in the stomach when kept in the above-mentioned form.

PILULÆ FERRI COMPOSITÆ, Lond. *Compound Iron Pills.*

"Take of myrrh, in powder, *two drachms;* carbonate of soda, sulphate of iron, treacle, of each, *a drachm.* Rub the myrrh with the carbonate of soda; then, having added the sulphate of iron, rub again; and, lastly, beat the whole into a uniform mass."

This is a useful emmenagogue pill, similar in its properties to Griffith's Mixture. The dose is from grs. x. to ℈ j., given twice or three times a day.

PILULÆ FERRI SULPHATIS, Edin. *Pills of Sulphate of Iron.*

"Take of dried sulphate of iron, *two parts;* extract of taraxacum, *five parts;* conserve of red roses, *two parts;* liquorice root powder, *three parts.* Beat them together into a proper mass, which is to be divided into five-grain pills."

This is a useful tonic pill, and may be given with advantage in dyspepsia and other affections in which steel is indicated. A five-grain pill will contain five-sixths of a grain of dried sulphate of iron.

PILULÆ RHEI ET FERRI, Edin. *Pills of Rhubarb and Iron.*

"Take of dried sulphate of iron, *four parts;* extract of rhubarb, *ten parts;* conserve of red roses, *five parts.* Beat them into a proper pill mass, and divide it into five-grain pills."

This is a useful combination, and well fitted to prove beneficial in atonic dyspepsia.

PILULÆ GALBANI COMPOSITÆ, Lond. *Compound Pills of Galbanum.*

"Take of galbanum, *two drachms;* myrrh, prepared sagapenum, of each, *three drachms;* prepared assafœtida, *a drachm;* soft soap, *two drachms;* treacle, *a sufficient quantity.* Beat them together into a uniform mass."

Syn. Pilules de Galbanum composée (*F.*), Pillole di Galbano composte (*I.*).

This preparation is a useful antispasmodic and emmenagogue; and is given with advantage in chlorosis, hysteria, and hypochondriasis. The dose is from grs. x. to ℈ j., taken every night at bed-time.

PILULÆ HYDRARGYRI, Lond. Edin. Dub. *Mercurial Pills.*

"Take of mercury, *half an ounce;* confection of rose, *six drachms;* liquorice, in powder, *two drachms.* Rub the mercury with the confection until the globules disappear: then add the liquorice root, and beat the whole into a uniform mass."

Edinburgh.

"Take of mercury, *two parts;* liquorice root, in powder, *one part;* conserve of red roses, *three parts.* Beat the mercury and conserve into a uniform mass till the globules of mercury can no longer be detected; then add the liquorice root, and beat the whole again into a proper mass, which is to be divided into five-grain pills."

In the Dublin Pharmacopœia, four times the amount of the in-

gredients are ordered to be taken. The rest of the process is the same as that given by the London College.

Syn. Pilules mercurieles (*F.*), Pillole mercuriale (*I.*).

One grain of mercury is contained in three grains of the mass.

In these preparations the mercury is first minutely divided by the viscosity of the conserve, the substance with which it is triturated, and it is supposed that the metal is partially oxidized; and that the great extension of surface, and, in some degree, the substance used in the trituration, facilitate this effect. It seems probable from recent experiments that the mercury is simply in a state of very minute mechanical division. Syrup, honey, mucilage, soap, guaiacum, and other matters, have been occasionally employed; on the Continent the oil of eggs has been used for dividing the mercury[1], and certainly no substance so rapidly assists in producing the desired effect as this oil, when it has been kept for some time. The more assiduously the trituration is continued the more perfect is the preparation. The sufficient division of the metal, or the extinction or killing of the mercury, in the common language of the laboratory, is known to be completed, when, on rubbing a small portion of the mass with the point of the finger on a piece of clean paper, no metallic globules are perceptible. The mass must be then immediately formed into pills, as it very rapidly becomes too hard, if allowed to remain. Should the conserve of roses contain any foreign acid as sulphuric, then a salt may be formed which would act as a powerful irritant.

Medical properties and uses. — These pills are alterative and antisyphilitic, and are the most common form under which mercury is exhibited for the cure of venereal affections, being much less liable to act on the bowels than any of the other forms. When they act on the bowels, they should be combined with opium, or with a few grains of rhubarb, which enable the bowels to resist the mercurial irritation. The common dose is from grs. v. to grs. x., or two pills, given twice a day, until the mouth be affected. Larger doses excite purging.

PILULÆ HYDRARGYRI CHLORIDI COMPOSITÆ, Lond. PILULÆ CALOMELANOS COMPOSITÆ, Edin. Dub. *Compound Pills of Chloride of Mercury. Compound Pills of Calomel.*

"Take of chloride of mercury (*calomel*), oxysulphuret of antimony, of each, *two drachms* (*one part*, E.); guaiacum resin, powdered, *half an ounce* (*two parts*, E.); treacle, *half an ounce* (*two parts*, E.). Rub the chloride of mercury with the oxysulphuret of antimony, then with the guaiacum resin and treacle; beat the whole to a proper consistence." (To be divided into six-grain pills, *E.*)

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[1] Vide *Lond. Med. Repository*, vol. v. p. 166.

Dublin.

"Take of calomel, precipitated sulphuret of antimony, of each, *one drachm;* guaiacum resin, in powder, *two drachms;* castor oil, *one fluid drachm.* Triturate the calomel with the antimony, then add the resin and oil, and beat the whole into a uniform mass."

This preparation was introduced into practice by Dr. Plummer, and admitted into the Edinburgh Pharmacopœia, under the name of Plummer's Pill. It was, however, afterwards expunged; but as it continued to be much used in practice, all the colleges have retained it. It is a very useful alterative in lepra, in secondary syphilis affecting the skin, and in other cutaneous diseases. The dose is from grs. v. to grs. x., given night and morning.

PILULÆ IPECACUANHÆ CUM SCILLA[1], Lond. *Pills of Ipecacuanha with Squill.*

"Take of compound powder of ipecacuanha, *three drachms;* fresh powdered squill, powdered ammoniacum, of each, *a drachm;* treacle, *a sufficient quantity.* Beat them together into a mass."

This form of pill is a stimulant expectorant, useful in some forms of asthma. The dose is grs. v. to grs. x.

PILULÆ IPECACUANHÆ ET OPII, Edin. *Pills of Ipecacuanha and Opium.*

"Take of the compound powder of ipecacuanha, *three parts;* conserve of red roses, *one part.* Beat them into a proper mass, which is to be divided into four-grain pills."

An unnecessary preparation.

PILULÆ PLUMBI OPIATÆ, Edin. *Opiated Lead Pills.*

"Take of acetate of lead, *six parts;* opium, *one part;* conserve of red roses, *about one part.* Beat them into a proper mass, which is to be divided into four-grain pills. This pill may be made with twice the quantity of opium."

PILULÆ RHEI COMPOSITÆ, Lond. Edin. Dub. *Compound Rhubarb Pills.*

"Take of powdered rhubarb *four drachms;* socotrine aloes, in powder, *three drachms;* powdered myrrh, *two drachms;* soft soap, *half a drachm;* oil of carraway, *fifteen minims;* treacle, *a sufficient quantity.* Mix the powders, and, the other ingredients being added, beat all together into a mass."

Edinburgh.

"Take of rhubarb, in powder, *twelve parts;* powdered aloes,

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[1] Pilula Ipecacuanhæ Compositæ, P. L. 1836.

nine parts; myrrh, *six parts;* Castile soap, *six parts;* oil of peppermint, *one part;* conserve of red roses, *five parts.* Mix them, and beat them into a proper mass, and divide this into five-grain pills."

Dublin.

"Take of rhubarb, in fine powder, *one ounce and a half;* hepatic aloes, in fine powder, *nine drachms;* myrrh, in fine powder, Castile soap, of each, *six drachms;* oil of peppermint, *one fluid drachm;* treacle, by weight, *two ounces.* Reduce the soap to a fine powder, and triturate it with the aloes and myrrh, then add the treacle and oil of peppermint, and beat the whole into a uniform mass."

Syn. Pilules de Rhubarbe composée (*F.*), Pillole di Rhabarbaro composte (*I.*)

This is a warm, stomachic, laxative pill, very useful for obviating costiveness, and at the same time giving tone to the bowels in dyspepsia and hypochondriasis. The dose is from grs. x. to ℈ j., given twice a day.

PILULÆ RHEI, Edin. *Rhubarb Pills.*

"Take of rhubarb, in fine powder, *nine parts;* acetate of potash, *one part;* conserve of red roses, *five parts.* Beat them into a proper mass, and divide it into five-grain pills."

A useful and efficient aperient in atonic dyspepsia.

PILULÆ SAPONIS COMPOSITÆ, Lond. Dub. *Compound Pills of Soap.*

"Take of powdered opium, liquorice, in powder, of each, *two drachms;* soft soap, *six drachms.* Beat them together into a mass."

Dublin.

"Take of opium, in fine powder, *half an ounce;* Castile soap, *two ounces;* distilled water, *half a fluid drachm,* or *as much as is sufficient.* Reduce the soap to a fine powder, add the opium and water, and beat the mixture into a mass of uniform consistence."

Five grains contain one grain of opium.

PILULÆ OPII, SIVE THEBAICÆ, Edin. *Pills of Opium.*

"Take of opium, *one part;* sulphate of potash, *three parts;* conserve of red roses, *one part.* Rub them into a proper mass, which is to be divided into five-grain pills. It is to be observed that this pill contains twice as much opium as the opium pill of the last Latin edition of this Pharmacopœia."

Five grains contain one grain of opium.

PILULÆ STYRACIS COMPOSITA, Lond. PILULÆ, STYRACIS, Edin. *Compound Pill of Storax.*

"Take of purified storax, *six drachms;* opium (powdered), saffron, of each, *two drachms.* Beat them together into a mass."

Edinburgh.

"Take of opium, and saffron, of each, *one part;* extract of storax, *two parts.* Beat them into a uniform mass, which is to be divided into four-grain pills."

Five grains of the London and four grains of the Edinburgh pill mass contain one grain of opium.

Syn. Pilules d'Opium (*F.*), Storax pillen (*G.*), Pillole d'Oppio (*I.*).

The substances with which the opium is combined in these pills do not interfere with its operation as an anodyne, but are intended chiefly to cover its odour and taste, in cases where the patient or his friends have an objection to opium; and it is also sometimes necessary that the word opium should not appear even in the prescription. The dose of these preparations differs, and must be regulated by the quantity of opium contained in that one which is adopted.

PILULÆ SCILLÆ COMPOSITÆ, Lond. Dub. *Compound Squill Pills.*

"Take of squill, freshly powdered, *one drachm;* ginger, powdered, ammoniacum, powdered, each, *two drachms;* soft soap, *three drachms;* treacle, *a sufficiency.* Mix the powders together; then the rest being added, beat them all together to form a mass."

Dublin.

"Take of squill, in fine powder, *two drachms and a half;* ginger, in fine powder, ammoniac, in fine powder, Castile soap, of each, *two drachms;* treacle, by weight, *half an ounce.* Reduce the soap to powder, and triturate it with the squill, ginger, and ammoniac; then add the treacle, and beat them all into a mass of uniform consistence."

PILULÆ SCILLÆ, Edin. *Squill Pills.*

"Take of squill, in fine powder, *five parts;* ammoniac, ginger, in fine powder, and Spanish soap, of each, *four parts;* conserve of red roses, *two parts.* Mix the powders; add the other articles; beat them into a uniform mass, and divide it into five-grain pills."

Syn. Pilules de Scille (*F.*), Pillole Squilitiche (*I.*).

These pills are useful expectorants in chronic bronchitis, dyspnœa, and asthma; and, combined with calomel and digitalis, in hydropic

affections. They are liable, however, to the same objections as the squill powder, the efficacy of the squill being much injured by keeping in either form; and it is perhaps better that it should be always given under an extemporaneous form, except when the tincture is used. The dose is from grs. iv. to xij., given three or four times a day.

PULVERES.

POWDERS.

THIS form of preparing medicines is the simplest, and perhaps the least objectionable; but it is not applicable to all the articles of the materia medica. Those remedies, which are very unpleasant to the taste; those which deliquesce rapidly when exposed to the air, or are very volatile; and those which require to be given in large doses, or which are not diffused readily in water, cannot with propriety be administered in the form of powder. Some substances cannot be reduced to powder unless they be very much dried; and the heat necessary for that purpose alters their properties; even the impalpable form given to powders is injurious to some resinous substances; and we cannot be surprised that a great alteration should be affected in a short time by the action of the air on so great an extension of surface as takes place in the operation usually adopted for reducing drugs to fine powder. *Cinchona*, *rhubarb*, *ipecacuanha*, and *guaiacum*, operate much less powerfully in the state of impalpable powder, such as is prepared on the great scale, by the wholesale druggists[1], than when reduced to that degree of fineness only, which can be effected by simply beating them in a mortar, and passing them through a sieve.

As powders are generally affected by the action of the air and light, all powders should be kept in opaque or green glass bottles. The effect of light on the majority of powders is rendered obvious by the labelled sides of clear bottles containing them, which are always turned to the light, becoming encrusted with the powder changed in its colour, while the other side remains clear and transparent.

In forming compound powders, it is necessary to sift the mixture after the materials have been well triturated together.

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[1] May not this often arise from adulteration, which occasionally has been practised to a great extent? — ED.

ABSTRACT of the Table of MM. Henry and Guibourt, showing the loss in powdering certain substances.
1000 Parts of

Roots.

Acorus Calamus	yield 840
Calumba	900
Jalap	940
Ipecacuanha	750
Rhatany	850
Rhubarb	920
Serpentaria	800

Leaves.

Belladonna	785
Conium	800
Digitalis	790
Henbane	530
Senna	790

Flowers.

Chamomile	850
Saffron	809

Fruits.

Mustard	950
Sabadilla	900
Black pepper	900
Nux vomica	850
Colocynth	500

Barks.

Cinchona, pale	yield 875
——— yellow	900
——— red	880
Cinnamon	890
Cusparia	825
Simaruba	900

Vegetable Products.

Aloes	960
Tragacanth	940
Opium	930
Gum Arabic	925
Scammony	915
Catechu	900

Animal Substances.

Castor	900
Cantharides	959

Mineral Substances.

Red Oxide of Mercury	980
Arsenious Acid	950
Sulphuret of Antimony	950
Red Sulph. of Mercury	950

PULVIS ALUMINIS COMPOSITUS, Edin. *Compound Powder of Alum.*

"Take of alum, *four ounces;* kino, *one ounce.* Mix them, and reduce them to fine powder."

This is a powerful astringent powder, and is sometimes used internally in menorrhagia and diarrhœa; but is more generally employed as an external application. The dose is from grs. x. to grs. xv.

PULVIS ALOES COMPOSITUS, Lond. *Compound Powder of Aloes.*[1]

"Take of socotrine or hepatic aloes, *an ounce and a half;* guaiacum, *an ounce;* compound powder of cinnamon, *half an ounce.* Powder the aloes and the guaiacum resin separately; then mix them with the compound powder of cinnamon."

A warm cathartic. Dose gr. x. to ℈j.; not often used.

[1] Pilulæ de diambræ, P. L. 1720. Pulvis aloes cum guaiaco, P. L. 1787.

PULVIS ANTIMONIALIS. *Antimonial Powder.* (See Antimonial Preparations.)

PULVIS CATECHU COMPOSITUS, Dub. *Compound Powder of Catechu.*

"Take of catechu, kino, of each, *two ounces;* cinnamon, nutmeg, of each, *half an ounce.* Reduce each to powder, mix, and pass through a fine sieve. When prepared, the powder should be kept in well-stopped bottles."

A useful aromatic astringent in cases where catechu and kino are indicated. Dose ʒj. to ʒij.

PULVIS CINNAMONI COMPOSITUS, Lond. *Compound Powder of Cinnamon.*[1]

"Take of cinnamon, *two ounces;* cardamoms, *an ounce and a half;* ginger, *an ounce;* long pepper, *half an ounce.* Rub them together to a very fine powder."

PULVIS AROMATICUS, Edin. Dub. *Aromatic Powder.*

"Take of cinnamon, cardamom seeds, and ginger, of each, *equal parts.* Mix them, and reduce to a very fine powder, which is to be kept in well-closed glass vessels."

Dublin.

"Take of cinnamon, ginger, of each, *two ounces;* cardamom seeds, freed from their capsules, nutmeg, of each, *one ounce.* Rub each separately to powder, and, having mixed them by trituration, pass through a fine sieve. When prepared, the powder should be kept in well-stopped bottles."

Syn. Poudre aromatique (*F.*), Gewur pulver (*G.*), Polvere aromatica (*I.*).

These combinations of aromatics are stimulant and carminative, and may be used to expel flatus in cold phlegmatic habits; but they are more generally employed to give warmth to other compositions. The dose is from grs. v. to ℈j.

PULVIS CRETÆ COMPOSITUS, Lond. Edin. Dub. *Compound Powder of Chalk.*

"Take of prepared chalk, *half a pound;* cinnamon, *four ounces;* tormentil, acacia, of each, *three ounces;* long pepper, *half an ounce.* Rub them separately to very fine powder; then mix them."

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[1] Species diambræ sine odoratis, P. L. 1720. Species aromaticæ, P. L. 1745. Pulvis aromaticus, P. L. 1787.

Edinburgh.

"Take of prepared chalk, *four ounces;* cinnamon, in fine powder, *a drachm and a half;* nutmeg, in fine powder, *a drachm.* Triturate them well together."

Dublin.

"Take of prepared chalk, *five ounces;* cinnamon, *two ounces and a half;* gum arabic, *two ounces;* nutmeg, *half an ounce.* Rub the ingredients separately to powder, then mix, and pass through a fine sieve."

Dose from grs. v. to ℨ ss., given generally in the form of mixture, rubbed up with mucilage and some distilled water.

PULVIS CRETÆ COMPOSITUS CUM OPIO, Lond. *Compound Powder of Chalk with Opium.*

"Take of compound chalk powder, *six ounces and a half;* powdered opium, *four scruples.* Mix."

PULVIS CRETÆ OPIATUS[1], Edin. Dub. *Opiate Powder.*

"Take of compound chalk powder, *six ounces;* powder of opium, *four scruples.* Triturate them together thoroughly."

Dublin.

"Take of compound powder of chalk, *four ounces and seven drachms;* opium, in fine powder, *one drachm.* Mix them intimately, and pass through a fine sieve."

Syn. Poudre opiate (*F.*), Opiums pulver (*G.*), Polvere oppiata (*I.*).

The addition of opium to the compound powder of chalk renders it more useful in diarrhœa; and from the minute division of the opium, it forms a useful opiate powder for children suffering under the irritative diarrhœa of teething. ℈ ij. contain gr. j. of opium. The dose is from ℈ j. to ℨ j. for adults.

PULVERES EFFERVESCENTES, Edin. *Effervescing Powders.*

"Take of tartaric acid, *one ounce;* bicarbonate of soda, *one ounce and fifty-four grains;* or bicarbonate of potassa, *one ounce, eight scruples.* Reduce the acid and either bicarbonate separately to fine powder, and divide each into sixteen powders; preserve the acid and alkaline powders in separate papers of different colours."

Agreeable refrigerants, and substitutes for soda water.

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[1] Pulvis opiatus, P. L. 1787.

PULVERES EFFERVESCENTES CITRATI, Dub. *Effervescing Citric Powders.*

"Take of crystals of citric acid, *nine drachms;* bicarbonate of soda, *eleven drachms;* or bicarbonate of potash, *thirteen drachms.* Reduce the acid and alkaline bicarbonates, separately, to a fine powder, and divide each into eighteen parts. The acid and alkaline powders should be kept in papers of different colours."

PULVERES EFFERVESCENTES TARTARIZATI, Dub. *Effervescing Tartaric Acid.*

"Take of crystals of tartaric acid, *ten drachms;* bicarbonate of soda, *eleven drachms;* or bicarbonate of potash, *thirteen drachms.* Reduce the acid and alkaline bicarbonates, separately, to a fine powder, and divide each into eighteen parts. The acid and alkaline powders should be kept in papers of different colours."

PULVIS JALAPÆ COMPOSITUS, Lond. Edin. Dub. *Compound Powder of Jalap.*

"Take of jalap, *three ounces;* bitartrate of potassa, *six ounces;* ginger, *two drachms.* Rub them, separately, into powder, then mix."

Edinburgh.

"Take of jalap, in powder, *one ounce;* bitartrate of potassa, *two ounces.* Triturate them to a very fine powder."

Dublin.

"Take of jalap, in fine powder, *two ounces;* bitartrate of potash, *three ounces and a half;* ginger, in fine powder, *half an ounce.* Mix throughly by trituration, and pass the powder through a fine sieve."

The bitartrate, besides dividing the jalap very minutely, modifies also its purgative operation. The ginger, in the London and Dublin formulæ is useful. This powder is a good purgative in habitual costiveness; it is also very serviceable to children with tumid bellies; in worm cases, and in dropsy. The dose is from ℈j. to ℈ij. for adults.

PULVIS IPECACUANHÆ COMPOSITUS, Lond. Edin. Dub. *Compound Powder of Ipecacuanha.*

"Take of powdered ipecacuanha, powdered opium, each *a drachm;* powdered sulphate of potassa, *an ounce.* Mix them."

Edinburgh.

"Take of ipecacuanha root, in powder, powder of opium, of each, *one ounce;* sulphate of potassa, *eight ounces.* Triturate them together thoroughly."

Dublin.

"Take of ipecacuanha, in fine powder, opium, in fine powder, of each, *one drachm ;* sulphate of potash, *one ounce.* Mix throughly by trituration, and pass the powder through a fine sieve."

Syn. Poudre d'Ipecacuanha et d'Opium (*F.*), Dover's schmerzstillendes pulver (*G.*), Polvere d'Ipecacuanha ed Oppio (*I.*).

In this powder the sulphate of potassa is intended to divide the opium mechanically; for on the finely powdered state of the ingredients depends much of the action of the opium and ipecacuanha. In the original *Dover's Powder,* the saline ingredient was procured by deflagrating a mixture of equal parts of nitrate of potassa and sulphate of potassa; and the nitre is still retained as an ingredient in the *compound powder of ipecacuanha and opium* of the French codex. The Pharmacopœia Danica and the Pharmacopœia Austriaca order sugar instead of any salt; but it is less calculated to assist in the pulverization of the opium, and is apt also to attract moisture, and form the powder into a solid mass.

Compound ipecacuanha powder operates as a powerful sudorific; and is very efficaciously given in all cases, whether inflammatory or not, in which sweating is indicated, the relaxant power of the ipecacuanha acting upon the skin. The dose is from grs. v. to ℈ j., diffused in mucilaginous fluid, or in the form of bolus. The action is assisted by plentiful dilution with tepid fluids; but these must not be drunk immediately after taking the powder, as they would aid its aptitude to be rejected by vomiting: nor should they be acidulous, for although acids do not augment the emetic properties of the ipecacuanha, yet they cause it to purge. Ten grains of this powder contain one grain of opium.

PULVIS KINO COMPOSITUS, Lond. *Compound Powder of Kino.*

"Take of kino, *fifteen drachms;* cinnamon, *half an ounce ;* dried opium, *a drachm.* Rub them separately to a very fine powder, then mix."

The dose is from grs. x. to ℈ j. Twenty grains of the powder contain one grain of opium. Useful astringent in pyrosis.

PULVIS RHEI COMPOSITUS, Edin. Dub. *Compound Powder of Rhubarb.*

"Take of magnesia, *one pound;* ginger, in fine powder, *two ounces;* rhubarb, in fine powder, *four ounces.* Mix them thoroughly, and preserve the powder in well-stopped bottles."

Dublin.

"Take of rhubarb, in fine powder, *two ounces;* magnesia, *six*

ounces; ginger, in fine powder, *one ounce.* Mix thoroughly by trituration, pass the powder through a fine sieve, and keep it in well-closed bottles."

The Edinburgh preparation is usually called *Gregory's Mixture:* it is a useful mild aperient for those predisposed to gout and dyspepsia. The dose is ℈ j. to ʒ ss.

PULVIS SALINUS COMPOSITUS, Edin. *Compound Saline Powder.*

"Take of pure muriate of soda, and sulphate of magnesia, of each, *four ounces;* sulphate of potassa, *three ounces.* Dry the salts separately with a gentle heat, and pulverize each, then triturate them well together, and preserve the mixture in well-closed vessels."

This powder is a simple purgative, and does not appear to possess any peculiar advantages.

PULVIS SCAMMONII COMPOSITUS, Lond. Edin. Dub. *Compound Powder of Scammony.*

"Take of scammony, hard extract of jalap, each, *two ounces;* ginger, *half an ounce.* Rub them separately to a very fine powder, and mix."

Edinburgh.

"Take of scammony, and bitartrate of potassa, of each, *equal parts.* Triturate them together to a very fine powder."

Dublin.

"Take of scammony, in fine powder, *one ounce;* compound powder of jalap, *three ounces.* Mix thoroughly by trituration, and pass the powder through a fine sieve."

Syn. Poudre de Scammonée composée (*F.*)

These powders, although agreeing in name, differ very considerably in their nature. In the first, the activity and the stimulating quality of the scammony are increased by the jalap, while the griping effect of the mixture is in some degree obviated by the ginger. In the second, the addition of the bitartrate detracts from the violence of the operation of the scammony, and renders it less irritating; although, at the same time, more certain. In the third we have the addition of both jalap and bitartrate of potash. The London is the most active, next the Edinburgh, and lastly the Dublin. The dose of the first is from grs. v. to grs. xv.; of the second, from grs. vij. to ℈ j.; of the third, from grs. x. to ʒ ss.

PULVIS TRAGACANTHÆ COMPOSITUS, Lond. Edin. *Compound Powder of Tragacanth.*

"Take of powdered tragacanth, powdered acacia gum, starch,

of each, *an ounce and a half;* sugar, *three ounces.* Rub the starch and sugar together to powder; then, the tragacanth and acacia being added, mix them all."

The ingredients and proportions are the same in the Edinburgh formula.

Syn. Poudre composée de Tragacanthe (*F.*), Tragacanthe Gummi pulver (*G.*), Polvere di Tragacanta composta (*I.*).

The starch might well be omitted, as it is insoluble in cold water. The powder is efficaciously used as a demulcent in hectic fever, and to allay the tickling cough of catarrh: in gonorrhœa and strangury it is given combined with nitre, and in dysentery with ipecacuanha powder. The dose is from ʒ ss. to ʒ iij., mixed in water, or any bland fluid.

SPIRITUS.

SPIRITS.

UNDER this title are placed alcohol, stronger and weaker spirits, and spirituous solutions of vegetable matters, formed by simple mixture, by maceration, and by distillation. They are uniform. transparent, and mostly unchanging solutions, containing in general a large proportion of volatile oil; and when prepared, are free from empyreuma. Pure alcohol is more volatile than many of the volatile oils, which do not therefore rise in distillation with it; and, consequently, proof or distilled spirit is employed. As medicinal agents, the spirits are stimulant and cordial; but sometimes bad habits are acquired from their continued use. They are employed to cover the taste and flavour of disagreeable medicines, and to make some which are apt to produce nausea sit light upon the stomach.

ALCOHOL, Edin. Dub. *Alcohol.*

"Take of rectified spirit, *one pint;* lime, *eighteen ounces.* Break down the lime into small fragments; expose the spirit and lime together to a gentle heat in a glass matrass till the lime begins to slake; withdraw the heat till the slaking is finished, preserving the upper part of the matrass cool with damp cloths. Then attach a proper refrigeratory, and with a gradually increasing heat distil off seventeen fluid ounces. The density of this alcohol should not exceed 796: if higher, the distillation must have been begun before the slaking of the lime was finished."

Dublin.

"Take of stronger spirit, *one pint;* pulverized fresh burned lime, *ten ounces.* Having introduced the lime and spirit into a matrass, connected in the usual manner with a Liebig's condenser, let heat be applied until the lime begins to slake, and, when this process is completed, distil, by means of a chloride of zinc bath, until the liquid which comes, together with that obtained during the slaking, measures two ounces. This being rejected the receiver should be changed, and the distillation resumed, and continued until a product of nearly sixteen ounces is procured. The specific gravity of this product is ·795."

Syn. Alcohol (*F.*), Höchst rektifizirter Weingiest (*G.*), Alcoole (*I.*).

Rectified spirit, and the stronger spirit of the Dublin College, contain still some small amount of water; and to free it from this is the intention of the above processes. The affinity of lime for water is so much greater than that of spirit, that the water which the rectified spirit contains is attracted by this substance, and prevented from rising with the spirit during the distillation, by which means the alcohol comes over in a highly concentrated state. By means of chloride of calcium, Dr. Black obtained alcohol of the specific gravity of ·800°; and Richter procured it so low as 0·796, at the temperature of 60° Fahrenheit[1], at which degree of concentration it may be regarded as alcohol or nearly free from water. There is much difficulty in clearing alcohol from the oil of grain (*fusel-öhl* of the Germans): it is most effectually purified by distilling that which is used for obtaining caustic potassa in a state of purity.[2] Dr. Christison says that, on a small scale, it is completely purified by adding to it a solution of nitrate of silver, and exposing the spirit to a bright light: a black powder is deposited.[3]

Qualities. — Alcohol is a colourless transparent fluid, with an agreeable odour, and a hot, pungent taste: it chemically combines with water: the bulk of the resulting mixture is less, and its specific gravity greater, than the mean of the two liquids before admixture; and much caloric is evolved. It is highly inflammable, burning with a pale yellowish-blue flame, the colour varying according to the strength of the alcohol: a blue flame indicates the strongest alcohol. During its combustion, water and carbonic acid are formed, the quantity of the water exceeding that of the alcohol consumed. When it is consumed on a red-hot platinum wire it does not inflame; and the result is acetic acid. It forms ethers with most acids. Alcohol boils at 172°; and as its boiling point is higher the more water it contains, its strength may be

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[1] *Crell's Annals*, 1796, ii. 211.

[2] Liebig.

[3] *Dispensatory.*

known by the degree at which it boils; allowing for the atmospheric pressure under which it is tried: in vacuo, it boils at 56°; it does not freeze at −166° Fahr. It dissolves about 60 parts of sulphur, when both the alcohol and the sulphur are in a state of vapour. It dissolves, also, the carbonic and boracic acids, pure ammonia, soda, and potassa; iodine, the iodides; phosphorus; lime; the volatile oils, resins, and gum-resins; soaps, camphor, sugar, extractive, and the vegetable alkaloids. As a pharmaceutical agent, alcohol, both in its pure and diluted state, is of the utmost importance. (See Part I.) Alcohol is generally viewed as being a hydrate of the oxide of ethyle, and as having the formula $C_4 H_5 O + H O$; some, however, regard it as containing only half the number of equivalents, and represent its composition by the formula $C_2 H_3 O$. Pure alcohol is never used as a medicinal agent, but it is ordered in the Dublin Pharmacopœia in the preparation of the *Essentia Fœniculi*, and the *Arsenici et Hydrargyri Liquor.*

SPIRITUS FORTIOR, Dub. *Stronger Spirit.*

"Take of rectified spirit, *half a gallon;* carbonate of potash from pearl-ash, *eight ounces.* Having dried the carbonate of potash at a low red heat, and rapidly reduced it to powder in a warm mortar, let it be shaken occasionally for four hours in a bottle with the spirit, maintaining the temperature of the mixture at about 100°. After a subsidence of twenty minutes' duration, the liquid will form two distinct strata, the uppermost of which (measuring about seventy-four ounces) should be separated by decantation or a syphon, and then distilled with the aid of a Liebig's condenser and chloride of zinc bath, until the product accounts to seventy-two ounces. The specific gravity of this spirit is 818."

This preparation consists of alcohol united with about eight per cent. of water, as will be seen by referring to the table given below. The spiritus rectificatus of the Dublin College sp. gr. ·840 contains 17 per cent. of water, a portion of which, by the action of the dried carbonate of potash, is removed, and the sp. gr. reduced to ·818. The spiritus fortior possesses properties intermediate between alcohol and rectified spirit, and is employed by the Dublin College in the preparation of alcohol and some essences, as *Essentia Menthæ piperitæ; Essentia Menthæ viridis; Essentia Myristicæ moschatæ.*

SPIRITUS TENUIOR, Edin. Dub. *Weaker Spirit.*

"Take of rectified spirit, *two pints;* distilled water, *one pint.* Mix them. The density of the product should be 912."

Dublin.

"Take of rectified spirit, *seven pints;* distilled water, *four pints.* Mix. The specific gravity of proof spirit is ·920."

These preparations consist of alcohol diluted with different amounts of water. The *Spiritus Tenuior* of the Dublin College, sp. gr. 920., contains about 51 per cent.; the Spiritus Tenuior of the Edinburgh College, sp. gr. 912., 48 per cent. These dilute alcohols are employed in the preparation of various essences, tinctures, &c. (See Spiritus Tenuior, Lond., Part II.)

THE following Table, drawn up by Lowitz, with an additional column by Dr. Thomson, shows the Specific Gravity of different Mixtures of pure Alcohol of a Specific Gravity ·791, and Distilled Water, at the temperature of 60° and 68° of Fahrenheit.

100 parts by weight.		Sp. Gravity.		100 parts by weight.		Sp. Gravity.		100 parts by weight.		Sp. Gravity.	
Alco.	Wat.	at 68°	at 60°	Alco.	Wat.	at 68°	at 60°	Alco.	Wat.	at 68°	at 60°
100	—	791	796	66	34	877	880	32	68	952	955
99	1	794	798	65	35	880	883	31	69	954	957
98	2	797	801	64	36	882	886	30	70	956	958
97	3	800	804	63	37	885	889	29	71	957	960
96	4	803	807	62	38	887	891	28	72	959	962
95	5	805	809	61	39	889	893	27	73	961	963
94	6	808	812	60	40	892	896	26	74	963	965
93	7	811	815	59	41	894	898	25	75	965	967
92	8	813	817	58	42	896	900	24	76	966	968
91	9	816	820	57	43	899	903	23	77	968	970
90	10	818	822	56	44	901	904	22	78	970	972
89	11	821	825	55	45	903	906	21	79	971	973
88	12	823	827	54	46	905	908	20	80	973	974
87	13	826	830	53	47	907	910	19	81	974	975
86	14	828	832	52	48	909	912	18	82	976	
85	15	831	835	51	49	912	915	17	83	977	
84	16	834	838	50	50	914	917	16	84	978	
83	17	836	840	49	51	917	920	15	85	980	
82	18	839	843	48	52	919	922	14	86	981	
81	19	842	846	47	53	921	924	13	87	982	
80	20	844	848	46	54	923	926	12	88	984	
79	21	847	851	45	55	925	928	11	89	986	
78	22	849	853	44	56	927	930	10	90	987	
77	23	851	855	43	57	930	933	9	91	988	
76	24	853	857	42	58	932	935	8	92	990	
75	25	856	860	41	59	934	937	7	93	992	
74	26	859	863	40	60	936	939	6	94	994	
73	27	861	865	39	61	938	941	5	95	995	
72	28	863	867	38	62	940	943	4	96	996	
71	29	866	870	37	63	942	945	3	97	997	
70	30	868	871	36	64	944	947	2	98	998	
69	31	870	874	35	65	946	949	1	99	999	
68	32	872	875	34	66	948	951	—	100	1000	
67	33	875	879	33	67	950	953				

TABLE, extracted from the Tables of Mr. Gilpin, showing the Real Specific Gravity of different mixtures of Spirit and Water at every 5° of temperature from 50° to 70°.[1] The standard spirit employed was of the specific gravity 0·825; or contained 89 pure alcohol, and 11 water, in 100 parts.

Proportions by weight of		REAL SPECIFIC GRAVITY.				
Spirit.	Water.	at 50°.	at 55°.	at 60°.	at 65°.	at 70°.
100	—	·82977	·82736	·82500	·82262	·82023
100	5	·84076	·83834	·83599	·83362	·83124
100	10	·85042	·84802	·84568	·84334	·84092
100	15	·85902	·85664	·85430	·85193	·84951
100	20	·86676	·86441	·86208	·85975	·85736
100	25	·87384	·87150	·86918	·86680	·86415
100	30	·88030	·87796	·87569	·87337	·87105
100	35	·88626	·88393	·88169	·87938	·87705
100	40	·89174	·88945	·88720	·88490	·88254
100	45	·89684	·89458	·89232	·89006	·88773
100	50	·90160	·89933	·89707	·89479	·89252
100	55	·90596	·90367	·90144	·89920	·89695
100	60	·90997	·90768	·90549	·90328	·90104
100	65	·91370	·91144	·90927	·90707	·90484
100	70	·91723	·91502	·91227	·91066	·90847
100	75	·92051	·91837	·91622	·91400	·91181
100	80	·92358	·92145	·91933	·91715	·91493
100	85	·92647	·92436	·92215	·92010	·91793
100	90	·92919	·92707	·92499	·92283	·92069
100	95	·93177	·92960	·92758	·92546	·92333
100	100	·93419	·93208	·93002	·92794	·92580
95	100	·93658	·93462	·93247	·93040	·92828
90	100	·93897	·93696	·93493	·93285	·93076
85	100	·94149	·93948	·93749	·93546	·93337
80	100	·94414	·94213	·94018	·93822	·93616
75	100	·94683	·94486	·94296	·94099	·93898
70	100	·94958	·94767	·94579	·94388	·94193
65	100	·95243	·95087	·94876	·94689	·94500
60	100	·95534	·95467	·95181	·95000	·94813
55	100	·95831	·95662	·95493	·95318	·95139
50	100	·96126	·95966	·95804	·95635	·95469
45	100	·96420	·96262	·96122	·95962	·95802
40	100	·96708	·96595	·96437	·96288	·96143
35	100	·96995	·96277	·96752	·96620	·96484
30	100	·97284	·97181	·97074	·96959	·96836
25	100	·97589	·97800	·97410	·97309	·97203
20	100	·97920	·97887	·97771	·97688	·97596
15	100	·98293	·98289	·98176	·98106	·98028
10	100	·98745	·98702	·98654	·98594	·98527
5	100	·99316	·99284	·99244	·99194	·99134

[1] *Phil. Trans.* for 1794, pp. 320—370.

ALCOHOL AMYLICUM, Dub. *Fusel Oil;* called also *Amylic Alcohol, Corn Spirit Oil, Grain* or *Potato Oil.*

"Take of the light liquid which may be obtained at any large distillery, by continuing the distillation for some time after the pure spirit has been all drawn off, *any convenient quantity.* Introduce it into a small still or retort connected with a condenser, and apply heat so as to cause distillation. As soon as the oil begins to come over unmixed with water, the receiver should be changed, and the distillation being resumed, and carried nearly to dryness, the desired product will be obtained. The liquid drawn over during the first part of the distillation will consist of an aqueous fluid, surmounted by a stratum of the fusel oil; this latter, though impregnated with a minute quantity of water, should be separated and preserved as being sufficiently pure for use."

The *Fusel oil,* or that product obtained towards the end of the distillation of spirit from grain, potatoes, &c., is a compound of *Amylic* alcohol, with common alcohol, fatty compounds, &c., varying with the substances from which the spirit is distilled. The formation of this body is by no means well understood; it seems, however, to be formed cotemporaneously with ordinary alcohol. The process ordered in the Dublin Pharmacopœia is for the purpose of separating most of the other bodies with which it is combined, for the alcohol and water pass over before the product is ordered to be preserved. To obtain the pure amylic alcohol, the impure fusel oil, after having been washed with water, must be frequently distilled, until the boiling point of the product is 269° Fah.

Qualities.—When pure, amylic alcohol is a colourless, oily-looking fluid, having a very strong and disagreeable odour, and a sharp, burning taste. Its sp. gr. is 0·818; it boils at 269° Fah., and freezes at 4° Fah.; it burns with difficulty. It is soluble in alcohol and ether, but very slightly so in water. When exposed to the air it suffers but little change, but when dropped warm on platinum sponge it undergoes oxidation, and is converted into *Valerianic acid,* identical with that contained in the root of the *Valeriana officinalis.* Pure fusel oil may be represented as a hydrate of the oxide of a radical called Amyle ($C_{10}\,H_{11}$), or as the alcohol of the amyle series. Its formula is $C_{10}\,H_{11}\,O + H\,O$. Fusel oil is only used in pharmacy in the preparation of the Valerianate of Soda. (See Sodæ Valerianas, Part III.)

SPIRITUS AMMONIÆ[1], Edin. *Spirit of Ammonia.*

"Take of rectified spirit, *two pints;* fresh-burnt lime, *twelve ounces;* muriate of ammonia, in very fine powder, *eight ounces;* water, *six fluid ounces and a half.* Let the lime be slaked with the water in an iron or earthenware vessel, and cover the vessel

[1] Spiritus salis Ammoniaci dulcis, P. L. 1745.

till the powder be cold; mix the lime and muriate of ammonia quickly and thoroughly in a mortar, and transfer the mixture at once into a glass retort; adapt to the retort a tube which passes nearly to the bottom of a bottle containing the rectified spirit; heat the retort in a sand-bath gradually, so long as any thing passes over, preserving the bottle cool. The bottle should be large enough to contain one half more than the spirit used."

Syn. Alcohol Ammoniacale (*F.*), Gristiger Ammonium liquor (*G.*), Alcoole Ammoniato (*I.*).

The spirit properly prepared has the pungent odour and acrid taste of ammonia, with which it coincides in its medicinal properties. It is employed chiefly for pharmaceutical purposes. It is used in the preparation of *Spiritus Ammoniæ aromaticus*, E. *Spiritus Ammoniæ fœtidus*, E. *Tinctura Castorei ammoniata*, E. *Tinctura Guaiai ammoniata*, E. *Tinctura Opii ammoniata*, E.

SPIRITUS AMMONIÆ AROMATICUS[1], Lond. Edin. Dub. *Aromatic Spirit of Ammonia.*

"Take of hydrochlorate of ammonia, *six ounces;* carbonate of potassa, *ten ounces;* cinnamon, bruised, cloves, bruised, each, *two drachms and a half;* lemon-peel, *five ounces;* rectified spirit, water, each, *four pints.* Mix, and distil six pints. The specific gravity of this is 918."

Edinburgh.

"Take of spirit of ammonia, *eight fluid ounces;* volatile oil of rosemary, *one fluid drachm and a half;* volatile oil of lemon-peel, *one fluid drachm.* Dissolve the oils in the spirit by agitation."

Dublin.

"Take of rectified spirit, *three pints;* stronger solution of ammonia, *six fluid ounces;* oil of lemon, *half a fluid ounce;* oil of nutmeg, *two fluid drachms;* oil of cinnamon, *half a fluid drachm.* Dissolve the oils in the spirit, and add the solution of ammonia; mix with agitation, and filter. The specific gravity of this solution is ·852."

A neutral carbonate of ammonia ($N H_3$, $C O_2$) is contained in the London preparation; in the Edinburgh and Dublin, the ammonia exists in a free state, dissolved in the spirit.

Medical properties and uses. — This spirit is a useful stimulant in languors and flatulent colic; the oils render it more grateful to the stomach than the simple spirit of ammonia. The dose is from f ʒss. to f ʒ j., in any convenient vehicle.

Officinal preparations.— *Tinctura Guaiaci composita*, L. *Tinctura Valerianæ composita*, L.

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[1] Spiritus volatilis aromaticus, P. L. 1748. Spiritus salis volatilis oleosus, P. L. 1720. Spiritus ammoniæ compositus, P. L. 1787.

SPIRITUS AMMONIÆ FŒTIDUS[1], Lond. Edin. Dub. *Fetid Spirit of Ammonia.*

"Take of hydrochlorate of ammonia, *ten ounces;* carbonate of potassa, *sixteen ounces;* rectified spirit, water, each, *three pints;* assafœtida, *five ounces.* Mix; then distil three pints over a slow fire. The specific gravity of this is ·861."

Edinburgh.

"Take of spirit of ammonia, *ten fluid ounces and a half;* assafœtida, *half an ounce.* Break the assafœtida into small fragments; digest them in the spirit for twelve hours; and distil over ten fluid ounces and a half by means of a vapour-bath heat."

Dublin.

"Take of assafœtida, *one ounce and a half;* rectified spirit, *one pint and a half;* stronger solution of ammonia, *three fluid ounces.* Break the assafœtida into small pieces, and macerate it in the spirit for twenty-four hours; then distil off the entire of the spirit, and mix the product with the solution of ammonia. The specific gravity of this preparation is ·849."

In these processes, the fetid volatile oil of the gum-resin is dissolved, and its odour and flavour communicated to the spirit; but very little else is taken up. Its medicinal properties are not different from those of the preceding spirit; and its dose is the same. It acquires colour from age.

SPIRITUS ANISI, Lond. *Spirit of Anise-seed.*

"Take of oil of aniseed, *three fluid drachms;* proof spirit, *a gallon.* Dissolve."

ESSENTIA ANISI, Dub. *Essence of Aniseed.*

"Take of oil of anise, *one fluid ounce;* rectified spirit, *nine fluid ounces.* Mix with agitation."

Syn. Alcohol d'Anis (*F.*), Alcoole Anisato (*I.*).

These are pleasant carminatives, useful in flatulent colic and similar affections. The dose is from f ʒss. to f ʒ iv., in water.

SPIRITUS ARMORACIÆ COMPOSITUS, Lond. *Compound Spirit of Horse-radish.*

"Take of horse-radish, sliced, dried orange-peel, each, *twenty ounces;* nutmegs, bruised, *five drachms;* proof spirit, *a gallon;* water, *two pints.* Mix, and distil a gallon by a gentle fire."

This spirit was formerly used as an antiscorbutic, but it possesses little value as such; and is now chiefly ordered in dropsies attended with much debility. The dose is from f ʒ ij. to f ʒ iv., combined with infusion of fox-glove or of juniper.

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[1] Spiritus volatilis fœtidus, P. L. 1745.

SPIRITUS CAMPHORÆ, Lond. *Spirit of Camphor.*

"Take of camphor, *five ounces;* rectified spirit, *two pints.* Dissolve."

Syn. Alcohol Camphré (*F.*), Kampfer spiritus (*G.*), Alcoole Canforato (*I.*).

The strength of the spirit renders this preparation unfit to be given internally; and the addition of water separates the camphor. It is a useful external application to chilblains, and in chronic rheumatism, paralytic numbness, and gangrene. See *Tinctura Camphoræ.*

SPIRITUS CARUI, Lond. Edin. *Spirit of Carraway.*

"Take of oil of carraway, *two fluid drachms;* proof spirit, *a gallon.* Dissolve."

Edinburgh.

"Take of carraway, bruised, *half a pound;* proof spirit, *seven pints.* Macerate for two days in a covered vessel; add a pint and a half of water, and distil off seven pints."

ESSENTIA CARUI, Dub. *Essence of Carraways.*

"Take of oil of carraway, *one fluid ounce;* rectified spirit, *nine fluid ounces.* Mix, with agitation."

Syn. Alcoole con Carvi (*I.*).

A useful carminative, and adjunct to griping purgatives.

SPIRITUS CASSIÆ, Edin. *Spirit of Cassia.*

"Take of cassia, in coarse powder, *one pound.* Proceed as for the spirit of carraway."

SPIRITUS CINNAMOMI, Lond. Edin. *Spirit of Cinnamon.*

"Take of oil of cinnamon, *two fluid drachms;* proof spirit, *a gallon.* Dissolve."

Edinburgh.

"Take of cinnamon, in coarse powder, *one pound.* Proceed as for the spirit of carraway."

ESSENTIA CINNAMOMI, Dub. *Essence of Cinnamon.*

"Take of oil of cinnamon, *one fluid ounce;* rectified spirit, *nine fluid ounces.* Mix, with agitation."

These spirits form an agreeable cordial in languor and debility. The dose is from f ʒ j. to f ʒ iv., in any convenient vehicle.

ESSENTIA FŒNICULI, Dub. *Essence of Fennel.*

"Take of oil of fennel, *one fluid ounce;* alcohol, *nine fluid ounces.* Mix, with agitation."

Used as a carminative.

SPIRITUS JUNIPERI COMPOSITUS, Lond. Edin. Dub. *Compound Spirit of Juniper.*

"Take of oil of juniper, *a fluid drachm and a half;* oil of carraway, oil of fennel, each, *twelve minims;* proof spirit, *a gallon.* Dissolve."

Edinburgh.

"Take of juniper berries, bruised, *a pound;* fennel, bruised, and carraway, bruised, of each, *an ounce and a half;* proof spirit, *seven pints;* water, *two pints.* Macerate the fruits in the spirit for two days; add the water, and distil off seven pints."

Dublin.

"Take of juniper berries, bruised, *eight ounces;* carraway seeds, bruised, fennel seeds, bruised, of each, *one ounce;* proof spirit, *half a gallon;* water, *one pint.* Macerate the berries and the seeds in the spirit for twenty-four hours; then add the water, and, with a slow fire, distil off half a gallon."

This spirit is a grateful and useful addition to infusions of foxglove, and other diuretics, in dropsy.

SPIRITUS LAVANDULÆ, Edin. *Spirit of Lavender.*

"Take of lavender, fresh, *two pounds and a half;* rectified spirit, *a gallon.* Mix them, and then, with the heat of a vapour-bath, distil over seven pints."

Syn. Teinture alcoholique de Lavande (*F.*), Lavendel-spiritus (*G.*).

Spirit of lavender is chiefly used as a perfume.[1]

SPIRITUS LAVANDULÆ COMPOSITUS, Edin. *Compound Spirit of Lavender.*

"Take of spirit of lavender, *two pints;* spirit of rosemary, *twelve fluid ounces;* cinnamon, in coarse powder, *one ounce;* cloves, bruised, *two drachms;* nutmegs, bruised, *half an ounce;* red sandal-wood, in shavings, *three drachms.* Let the whole macerate for seven days, and then strain the liquor through calico."

The addition of these aromatics to the spirit of lavender renders it a grateful cordial and stimulant, useful in languors and faintings, and as an adjunct to tonic and stomachic infusions. Its dose is from ♏ xxx. to f ℥ ij. See *Tinctura Lavandulæ Composita.*

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[1] Lavender water is seldom, as Mr. Brande remarks, a distilled spirit, and each manufacturer has his own recipe. The following is said to be the most approved: — Take of rectified spirit of wine, *five gallons;* essential oil of lavender, *twenty ounces* essential oil of bergamotte, *five ounces;* essence of ambergris, *half an ounce.* Mix.

SPIRITUS MENTHÆ PIPERITÆ, Lond. *Spirit of Peppermint.*

"Take of oil of peppermint, *three fluid drachms;* proof spirit, *a gallon.* Dissolve."

SPIRITUS MENTHÆ, Edin. *Spirit of Mint.*

"Take of peppermint, fresh, *one pound and a half.* Proceed as for spirit of carraway."

ESSENTIA MENTHÆ PIPERITA, Dub. *Essence of Peppermint.*

"Take of oil of peppermint, *one fluid ounce;* stronger spirit, *nine fluid ounces.* Mix, with agitation."

Syn. Teinture alcoholique de Menthe Poivrée (*F.*), Alcoole con Menta piperitide (*I.*).

A useful carminative in nausea and flatulence, and as an adjunct to purgative remedies.

SPIRITUS MENTHÆ VIRIDIS, Lond. *Spirit of Spearmint.*

"Take of oil of spearmint, *three fluid drachms;* proof spirit, *a gallon.* Dissolve."

ESSENTIA MENTHÆ VIRIDIS, Dub. *Essence of Spearmint.*

"Take of oil of spearmint, *one fluid ounce;* stronger spirit, *nine fluid ounces.* Mix with agitation."

Used as the last preparation.

SPIRITUS MYRISTICÆ, Lond. Edin. *Spirit of Nutmeg.*

"Take of nutmegs, bruised, *two ounces and a half;* proof spirit, *a gallon;* water, *a pint.* Mix: then distil a gallon over a slow fire."

The Edinburgh process resembles the London.

ESSENTIA MYRISTICÆ MOSCHATÆ, Dub. *Essence of Nutmegs.*

"Take of oil of nutmegs, *one fluid ounce;* stronger spirit, *nine fluid ounces.* Mix with agitation."

Used as a stimulant and carminative.

SPIRITUS PIMENTÆ, Lond. Edin. *Spirit of Pimento.*

"Take of oil of pimento, *two fluid drachms;* proof spirit, *a gallon.* Dissolve."

Edinburgh.

"Take of pimento, bruised, *half a pound.* Proceed as for spirit of carraway."

ESSENTIA PIMENTÆ, Dub. *Essence of Pimento or Allspice.*

"Take of oil of pimento, *one fluid ounce;* rectified spirit, *nine fluid ounces.* Mix with agitation."

A useful carminative in flatulent colic, atonic gout, and dyspepsia.

SPIRITUS PULEGII, Lond. *Spirit of Penny-royal.*

"Take of oil of penny-royal, *three fluid drachms;* proof spirit, *a gallon.* Dissolve."

ESSENTIA MENTHÆ PULEGII, Dub. *Essence of Penny-royal.*

"Take of oil of penny-royal, *one fluid ounce;* rectified spirit, *nine fluid ounces.* Mix with agitation."

Used the same as the Spirit of Peppermint.

SPIRITUS ROSMARINI, Lond. Edin. *Spirit of Rosemary.*

"Take of oil of rosemary, *two fluid drachms;* rectified spirit, *a gallon.* Dissolve."

Edinburgh.

"Take of rosemary, *two pounds and a half.* Proceed as for spirit of lavender."

ESSENTIA ROSMARINI, Dub. *Essence of Rosemary.*

"Take of oil of rosemary, *one fluid ounce;* rectified spirit, *nine fluid ounces.* Mix with agitation."

Syn. Esprit de Rosmarin (*F.*), Rosmarien-spiritus (*G.*), Alcoole Rosmarinato (*I.*).

It is a fragrant perfume.[1]

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[1] The following are the best recipes for *Hungary Water* and *Eau de Cologne.*

Hungary Water.

Take of fresh rosemary, in blossom, *four pounds;* fresh sage, in blossom, *eight ounces;* ginger root, *two ounces.* Cut, bruise, and pour upon them twelve pints of rectified spirit and two pints of water. Distil, with a slow fire, eleven pints.

Eau de Cologne.

Take of alcohol, *one pint;* oil of bergamotte, oil of orange-peel, oil of rosemary, of each, *one drachm;* bruised cardamom seeds, *one drachm;* orange-flower water, *one pint.* Distil, from a water-bath, *one pint.*

SYRUPI.

SYRUPS.

THESE are saturated solutions of sugar in water, either simple, or united with some vegetable principle, with the view either to colour, flavour, or medicinal virtue: but for the last intention this is perhaps the worst of all forms for obtaining the medicinal qualities of substances; and, therefore, as syrups seldom possess much activity, they are chiefly employed to render more active remedies palatable. Upon the whole, however, they are not well adapted even for this purpose, few persons thinking that sweetness renders a nauseous drug more palatable; and, with a few exceptions, they might be properly rejected from the pharmacopœias.

In making syrups, the great object should be the prevention of the spontaneous decomposition to which they are liable. Pure sugar is not susceptible of spontaneous decomposition; refined sugar, therefore, should always be employed, or, if coarser sugar be used, the syrup should be clarified, by beating to a froth the white of eggs, with a small portion of water, and adding it to the solution of sugar and water before boiling them. The albumen coagulates as the syrup boils, and, involving the impurities which the sugar contained, rises to the surface in the form of a scum, which must be carefully removed. If too much sugar be used, or if the syrup be too long boiled, the sugar soon crystallizes, from its conversion into grape sugar; and this crystallization weakens the syrup so much that it soon ferments and spoils: again, if the quantity of the sugar be in too small proportion, and the boiling not sufficient, the syrup also quickly ferments, and becomes acescent. In boiling syrups the lower the temperature the better; hence the introduction of a few pieces of glass or of platinum is proper, as ebullition takes place under the usual boiling point when these are present. The most certain test of the proper consistence of a syrup is its specific gravity, which, when cold, should be 1·385. But, however well prepared, syrups are apt to ferment when kept in a high temperature; therefore, the following direction relative to their preservation is given by the London College: —

"Let syrups be preserved in a place the temperature of which never exceeds 55°."[1]

[1] Dr. Macculloch informs us, that by the addition of a small quantity of *sulphate of potassa*, or of the *chlorate of potassa*, which is a tasteless salt, the fermentation of syrups may be effectually prevented. See *Essay on Wine.*

It will be observed that a small amount of spirit is now ordered to be added to the syrups by the London College, for the purpose of preserving them.

SYRUPUS, Lond. *Syrup.*

"Take of sugar, *three pounds;* distilled water, *a pint.* Dissolve the sugar in the water by means of a gentle heat."

SYRUPUS SIMPLEX, Edin. Dub. *Simple Syrup.*

"Take of pure sugar, *ten pounds;* boiling water, *three pints.* Dissolve the sugar in the water with the aid of a gentle heat."

Dublin.

"Take of refined sugar, in powder, *five pounds;* distilled water, *two pints.* Dissolve the sugar in the water by the aid of a steam or water heat. The specific gravity of this syrup is 1330."

Syn. Sirop (*F.*), Einfacher syrup (*G.*), Sciroppo (*I.*).

Simple syrup, when properly prepared, should be inodorous, sweet, thickish, nearly colourless, and perfectly transparent. When Beaumé's saccharometer stands at 30° in the syrup at 212°, the water is fully saturated with the sugar. Distilled water should be used.

SYRUPUS ACETI, Edin. *Syrup of Vinegar.*

"Take of vinegar, French in preference, *eleven fluid ounces;* pure sugar, *fourteen ounces.* Boil them together."

Syn. Sirop d'Acide acétique (*F.*), Sciroppo acetico (*I.*).

This syrup is very liable to undergo decomposition: it should therefore be made in small quantities only at a time.

It may be used for sweetening barley-water or gruels, in fevers and inflammatory diseases.

SYRUPUS ACIDI CITRICI, Dub. *Syrup of Citric Acid.*

"Take of citric acid, in powder, distilled water, of each, *two and a half ounces;* tincture of lemon-peel, *five fluid drachms;* simple syrup, *three pints.* Dissolve the acid in the water by the aid of heat, then add the solution and tincture of lemon-peel to the syrup, and mix with agitation."

This is a very pleasant syrup, more agreeable than the Syrupus Aceti: used for the same purposes.

SYRUPUS ALTHÆÆ, Lond. Edin. *Syrup of Marsh-mallow.*

"Take of sliced althæa root, *an ounce and a half;* sugar, *three pounds,* or *as much as required;* distilled water, *a pint;* rectified

spirit, *two ounces and a half*, or *as much as sufficient.* Macerate the althæa root in water for twelve hours, express out the liquor, filter through linen, then add of sugar twice the weight of the strained liquid, and dissolve with a gentle heat. Lastly, when the syrup has cooled, mix to each fluid ounce half a fluid drachm of spirit."

Edinburgh.

"Take of althæa root, fresh and sliced, *eight ounces;* boiling water, *four pints;* pure sugar, *two pounds and a half.* Boil the althæa root with the water down to two pints, strain, and express strongly through calico; let the impurities subside, and dissolve the sugar in the clear liquor with the aid of heat."

Syn. Sirop d'Althea (*F.*), Althee syrup (*G.*), Sciroppo d'Altea (*I.*).

This is a solution of mucilage in syrup, supposed to possess demulcent properties; but these are very trivial. Owing to the small proportion of sugar the Edinburgh preparation contains, it very soon suffers spontaneous decomposition.

SYRUPUS AURANTII, Lond. Edin. Dub. *Syrup of Orange-peel.*

"Take of dried orange-peel, *two ounces and a half;* boiling distilled water, *a pint;* sugar, *three pounds*, or *as much as may be necessary;* rectified spirit, *two fluid ounces and a half*, or *as much as is required.* Macerate the peel in the water for twelve hours in a covered vessel, press out the liquor, and boil for ten minutes; then strain, and complete the process in the same manner as has been directed for Syrup of Marsh-mallows."

Edinburgh.

"Take of the fresh bitter-orange peel, *two ounces and a half;* boiling water, *one pint;* pure sugar, *three pounds.* Infuse the peel in the water for twelve hours in a covered vessel, pour off the liquor and filter it if necessary, then add the sugar to the liquor, and dissolve it with the aid of heat."

Dublin.

"Take of bitter-orange peel, dried, *two ounces and a half;* boiling distilled water, *one pint;* refined sugar, in powder, *as much as is sufficient.* Infuse the orange-peel in the water in a covered vessel for twelve hours, and strain without expression; then add to the liquor twice its weight of sugar, and dissolve with the aid of a steam or water heat."

Syn. Sirop d'écorce d'Orange (*F.*), Pomeranzenschalen syrup (*G.*), Sciroppo di Corteccia di Arancio (*I.*).

A syrup, equally agreeable and efficacious, may be made by adding f ℥ j. of tincture of orange-peel to a pint of simple syrup.

SYRUPUS COCCI, Lond. *Syrup of Cochineal.*

"Take of bruised cochineal, *four scruples;* boiling distilled water, *a pint;* sugar, *three pounds,* or *as much as may be sufficient;* rectified spirit, *two fluid ounces and a half,* or *as much as may be sufficient.* Boil the cochineal for fifteen minutes in the water in a closed vessel, frequently stirring it; then strain, and complete the process as has been directed for Syrup of Marsh-mallow."

Used as a colouring agent only.

SYRUPUS CROCI, Lond. Edin. Dub. *Syrup of Saffron.*

"Take of saffron, *five drachms;* boiling distilled water, *a pint;* sugar, *three pounds,* or *as much as required;* rectified spirit, *two ounces and a half,* or *as much as required.* Macerate the saffron in the water for twelve hours, in a covered vessel; then filter the liquor, and complete the process as has been directed for Syrup of Marsh-mallow."

Edinburgh.

"Take of saffron, *ten drachms;* boiling water, *one pint;* sugar, *three pounds.* Proceed as for the syrup of orange-peel."

Dublin.

"Take of saffron, chopped fine, *half an ounce;* boiling distilled water, *one pint;* refined sugar, in powder, *as much as is sufficient.* Infuse the saffron in the water, in a covered vessel, for twelve hours; then boil for five minutes, and strain through calico, with expression; let the decoction stand until the sediment subsides, and, having then decanted the clear liquor, add to it twice its weight of sugar, and dissolve with the aid of a steam or water heat."

Syn. Sirop de Safran (*F.*), Safran syrup (*G.*).

This syrup is cordial in a small degree; but it is chiefly valued on account of its beautiful colour.

SYRUPUS FERRI IODIDI, Lond. Edin. Dub. *Syrup of Iodide of Iron.* See *Ferri Iodidum* (Metallic Preparations).

SYRUPUS HEMIDESMI, Dub. *Syrup of Indian Sarsaparilla.*

"Take of Indian sarsaparilla, bruised, *four ounces;* boiling distilled water, *one pint;* refined sugar, in powder, *as much as is sufficient.* Infuse the sarsaparilla in the water for four hours in a covered vessel, and strain; set it by until the sediment subsides, then decant the clear liquor, and, having added to it twice its weight of sugar, dissolve with the aid of a steam or water heat."

A very useless preparation.

SYRUPUS IPECACUANHÆ, Edin. *Syrup of Ipecacuanha.*

"Take of ipecacuan, in coarse powder, *four ounces;* rectified spirit, *one pint;* proof spirit, and water, of each, *fourteen fluid ounces;* syrup, *seven pints.* Digest the ipecacuan in fifteen fluid ounces of the rectified spirit at a gentle heat for twenty-four hours; strain, squeeze the residuum, and filter. Repeat this process with the residuum and proof spirit, and again with the water; unite the fluids, and distil off the spirit till the residuum amounts to twelve ounces; add to the residuum five fluid ounces of the rectified spirit, and then the syrup."

This syrup is employed as an emetic for children, and as an expectorant in bronchitic affections. The dose for the former purpose is from f ʒ ss. to f ʒ j.; for the latter f ʒ j. to f ʒ ij. for adults.

SYRUPUS LIMONUM, Lond. Edin. *Syrup of Lemon.*

"Take of lemon-juice, strained, *a pint;* sugar, *two pounds and half;* rectified spirit, *two fluid ounces and a half.* Boil the juice for ten minutes, and strain; to this add the sugar, and dissolve it. Lastly, when the syrup has cooled, mix in the spirit."

Edinburgh.

"Take of lemon-juice, freed of impurities by subsidence and filtration, *a pint;* sugar, *two pounds and a half.* Dissolve the sugar in the lemon-juice with the aid of a gentle heat, and, after twenty-four hours rest, remove the scum, and pour the clear liquor from the dregs."

Syn. Zitronensaft syrup (*G.*).

This is an agreeable syrup for acidulating barley-water or other drinks in febrile diseases. It is also a useful adjunct to gargles in inflammatory sore throat.

SYRUPUS MORI, Lond. *Syrup of Mulberry.*

"Take of strained mulberry-juice, *a pint;* sugar, *two pounds and a half;* rectified spirit, *two fluid ounces and a half.* Dissolve the sugar in the juice by a gentle heat, and set by for twenty-four hours; then remove the scum, and from the dregs, if there be any, pour off the clear liquid: lastly, add the spirit."

Syn. Maulbeer syrup (*G.*).

This syrup is used for the same purposes as the syrup of lemons, and has besides the advantage of colour.

SYRUPUS MORPHIÆ ACETATIS, Dub. *Syrup of Acetate of Morphia.*

"Take of solution of acetate of morphia, *one fluid ounce;* simple syrup, *fifteen fluid ounces.* Mix, with agitation."

SYRUPUS MORPHIÆ MURIATIS, Dub. *Syrup of Muriate of Morphia.*

"Take of solution of muriate of morphia, *one fluid ounce;* simple syrup, *seventeen fluid ounces.* Mix, with agitation."

A quarter of a grain of acetate or muriate of morphia is contained in a f ℥ j. of these syrups. It will be noticed that, in the syrup of the acetate, fifteen ounces of simple syrup are mixed with one ounce of the solution; in the case of the muriate, seventeen ounces; but the solution of the latter salt is the stronger.

SYRUPUS PAPAVERIS, Lond. Edin. *Syrup of Poppy.*

"Take of bruised poppies, the seeds being removed, *three pounds;* sugar, *five pounds;* boiling distilled water, *five gallons;* rectified spirit, *five fluid ounces.* Boil down the capsules in water to two gallons, and express strongly. Boil the strained liquor again down to four pints, and strain it while it is hot. Set it aside for twelve hours that the fæces may subside; then boil down the clear liquor to two pints, add the sugar, and dissolve it. Lastly, mix with it the spirit."

Edinburgh.

"Take of poppy-heads, without the seeds, *one pound and a half;* boiling water, *fifteen pints;* refined sugar, *three pounds.* Slice the poppy-heads, infuse them in the water for twelve hours; boil down to five pints; strain, and express strongly through calico; boil again down to *two pints and a half;* then add the sugar, and dissolve it with the aid of heat."

Syn. Sirop de Pavot blanc (*F.*), Syrup von Weissen Mohn (*G.*), Sciroppò di Papaveri bianchi (*I.*).

The narcotic principle of the poppy is taken up by the water. This syrup ferments more readily than most other syrups. M. Chereau asserts, that the addition of 32 parts of sugar of milk to 1000 of this syrup prevents the fermentation. One fluid ounce of it contains about one grain of extract. The syrup should be, at a temperature of 212°, of a density of 32° of Beaumé.

Medical properties and uses. — Syrup of poppy is a useful anodyne for allaying the violence of cough, for easing pain, and procuring sleep in children's diseases: it should not be given to children when it is in a state of fermentation. The dose is from f ʒ j. to f ℥ j., according to the age of the patient.

SYRUPUS RHŒADOS, Lond. Edin. *Syrup of the Red Poppy.*

"Take of the petals of the red poppy, *a pound;* boiling distilled

water, *a pint;* sugar, *three pounds,* or *as much as may be sufficient;* rectified spirit, *two fluid ounces and a half,* or *as much as may be necessary.* To the water, heated in a water-bath, add gradually the petals of the red poppy, stirring them occasionally, then, having removed the vessel, macerate for twelve hours; press out the liquor with the hand, strain, and finish the process as directed for Syrup of Marsh-mallow."

Edinburgh.

"Take of corn poppy petals, *one pound;* boiling water, *one pint;* pure sugar, *two pounds and a half.* Heat the water over a vapour-bath, add the petals by degrees, stirring occasionally; remove the vessel from the bath; infuse for twelve hours; strain and express the liquor; add to it the sugar, and dissolve this with the aid of heat."

Syn. Sirop de Coquelicot (*F.*), Klapprosen syrup (*G.*).

By attending strictly to the directions of either of the above formulæ, the petals yield their fine rich colour, for which alone the syrup is valued.

SYRUPUS RHAMNI [1], Lond. Edin. *Syrup of Buckthorn.*

"Take of the juice of buckthorn, *four pints;* ginger, sliced, pimento, bruised, of each, *six drachms;* sugar, *six pounds;* rectified spirit, *six fluid ounces.* Set apart the juice for three days, that the fæces may subside; then strain it. To a pint of the defecated juice add the ginger and pimento; then macerate, by a gentle heat, for four hours, and strain. Boil the remainder of the juice down to a pint and a half; mix the liquors, and add the sugar, and dissolve it; lastly mix in the spirit."

Edinburgh.

"Take of the fresh juice of buckthorn berries, *four pints;* ginger, sliced, and pimento, bruised, of each, *six drachms;* pure sugar, *four pounds.* Let the juice rest for three days; pour off the clear liquor, and filter it. Digest the ginger and pimento in a pint of the filtered liquor at a gentle heat for four hours, and filter. Boil down the rest of the juice to one pint and a half; mix the two liquors, add the sugar, and dissolve it with the aid of heat."

The addition of the ginger and allspice in these formulæ tends to cover the unpleasant taste of the buckthorn juice, and prevent the violent griping which it is apt to induce. It is a brisk cathartic; but owing to the unpleasantness of its operation, and the dryness of the mouth and fauces which it occasions, it is seldom

[1] Syr. de spina cervina, P. L. 1720. Syrupus spinæ cervinæ, P. L. 1787.

used, except as a horse-medicine. The dose is from f℥ss. to f℥j., drinking freely of tepid demulcent fluids during its operation.

SYRUPUS ROSÆ[1], Lond. *Syrup of the Rose.*

"Take of the petals of the damask rose, *seven ounces;* sugar, *six pounds;* boiling distilled water, *three pints;* rectified spirit, *five fluid ounces and a half.* Macerate the rose petals in the water for twelve hours, and strain; evaporate the strained liquor in a water-bath, down to *two pints;* then add the sugar, and dissolve; lastly mix with it the spirit."

SYRUPUS ROSÆ CENTIFOLIÆ, Edin. *Syrup of the Damask Rose.*

"Take of fresh damask rose petals, *one pound;* boiling water, *three pints;* pure sugar, *three pounds.* Infuse the petals in the water for twelve hours; strain the liquor, and dissolve the sugar in it with the aid of heat."

This syrup has none of the agreeable odour of the rose, but possesses a weak purgative property; on which account it is given as a laxative in very delicate habits, and to infants. The dose is from fʒij. to fʒxij., or more.

SYRUPUS ROSÆ GALLICÆ, Edin. Dub. *Syrup of Red Roses.*

"Take of dried red-rose petals, *two ounces;* boiling water, *one pint;* pure sugar, *twenty ounces.* Proceed as for Syrup of Damask Rose."

Dublin.

"Take of petals of the Gallic rose, dried, *two ounces;* boiling distilled water, *one pint;* refined sugar, in powder, *as much as is sufficient.* Boil the petals in the water in a glass or porcelain vessel, until their colour is completely extracted; strain with expression, and let the decoction stand until the sediment subsides; then, having decanted the supernatant liquor, add to it twice its weight of sugar, and dissolve with the aid of a steam or water heat."

Syn. Sirop de Roses rouges (*F.*), Rosen syrup (*G.*), Sciroppo di Rose Rosse (*I.*).

This syrup is a very weak astringent; and as such is added to astringent and stomachic infusions and gargles.

SYRUPUS SARZÆ, Lond. Edin. *Syrup of Sarsaparilla.*

"Take of sarsaparilla, *three pounds and a half;* distilled water, *three gallons;* sugar, *eight ounces;* rectified spirit, *two fluid ounces.*

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[1] Syr. e rosis siccis, P. L. 1720. Syr. rosarum solutivus, P. L. 1745.

Boil the sarsaparilla in two gallons of water down to a gallon; pour off the liquor, and strain while hot. Again boil the sarsaparilla in the remaining water down to half, and strain. Evaporate the liquors mixed together, to two pints, and in these dissolve the sugar. Lastly, when they have cooled, add to them the spirit."

Edinburgh.

"Take of sarza in chips, *fifteen ounces;* boiling water, *a gallon;* pure sugar, *fifteen ounces.* Infuse the sarsaparilla in the water for twenty-four hours, boil down to four pints, and strain the liquor while hot. Add the sugar, and evaporate to the consistence of syrup."

This is a trifling preparation, and of no use but as an adjunct to the decoction of sarsaparilla. It can be much better and more easily supplied by rubbing up a few grains of the extract with some simple syrup.

SYRUPUS SCILLÆ, Edin. Dub. *Syrup of Squill.*

"Take of vinegar of squill, *three pints;* pure sugar, in powder, *seven pounds.* Dissolve the sugar in the vinegar of squills, with the aid of a gentle heat and agitation."

Dublin.

"Take of vinegar of squill, *eight fluid ounces;* refined sugar, in powder, *one pound.* Dissolve the sugar in the vinegar of squill, with the aid of a steam or water heat."

Syn. Sirop acéteux de Scille (*F.*), Sciroppo di Squilla marino acetoso (*I.*).

This syrup has the same properties as the oxymel of squill. The dose is from f℥j. to f℥ij., given in any aromatic distilled water.

SYRUPUS SENNÆ, Lond. Edin. *Syrup of Senna.*

"Take of senna, *three ounces and a half;* fennel, bruised, *ten drachms;* manna, *three ounces;* treacle, *three pounds;* boiling distilled water, *a pint.* Macerate the senna and fennel seed in the water for six hours with a gentle heat; strongly press out the liquor through linen, strain and add to it the manna. Evaporate the treacle in a water-bath until some part of it most remote from the fire almost concretes, and to it, while hot, add the liquor, stirring diligently, until they are well mixed."

Edinburgh.

"Take of senna, *four ounces;* boiling water, *one pint and four fluid ounces;* treacle, *forty-eight ounces.* Infuse the senna in the water for twelve hours; strain, and express strongly through calico, so as to obtain a pint and two fluid ounces at least of liquid.

Concentrate the treacle in the vapour-bath as far as possible, or till a little taken out upon a rod becomes nearly concrete on cooling; and while the treacle is still hot add the infusion, stirring carefully, and removing the vessel from the vapour-bath as soon as the mixture is complete. If Alexandrian senna be used for this preparation, it must be carefully freed of cynanchum leaves by picking it."

This syrup contains the purgative properties of the senna, and is chiefly intended for children. Dose, f℥j. to f℥iv.

SYRUPUS TOLUTANUS[1], Lond. Edin. Dub. *Syrup of Tolu.*

"Take of balsam of Tolu, *ten drachms;* boiling distilled water, *a pint;* sugar, *two pounds and a half.* Boil the balsam in the water for half an hour, in a close vessel, frequently stirring it, and strain the liquor when it is cold; then add the sugar, and dissolve it."

Edinburgh.

"Take of simple syrup, *two pounds;* tincture of Tolu, *an ounce.* When the syrup has been recently prepared, and has not altogether cooled, add the tincture of Tolu by degrees, agitating briskly."

Dublin.

"Take of balsam of Tolu, *one ounce;* distilled water, *one pint;* refined sugar, in powder, *as much as is sufficient.* Boil the balsam in the water for half an hour, in a lightly covered vessel, occasionally stirring, and strain the liquor when cold; then, having added to it twice its weight of sugar, dissolve with the aid of a steam or water heat."

Syn. Sirop Balsamique (*F.*).

By following the London and Dublin formulas, a more elegant and grateful syrup is obtained than that produced by the Edinburgh method: but the syrup ordered by the Edinburgh College is sufficient for the uses to which it is applied. Chemists, in preparing the syrup by the London formula, usually add half the sugar to the water and the balsam, and simmer in a water-bath for twelve hours. When the decoction is cold, it is filtered, the remainder of the sugar is added, and the syrup completed. It is whitish and turbid, owing to a partial decomposition of the tincture, which deposits its resin when mixed with the syrup. It is used to give a pleasant flavour to draughts and mixtures.

SYRUPUS VIOLÆ, Lond. Edin. *Syrup of Violet.*

"Take of violets, *nine ounces;* boiling distilled water, *a pint;*

[1] Syr. balsamicus, P. L. 1720.

sugar, *three pounds*, or *as much as may be necessary;* rectified spirit, *two fluid ounces and a half*, or *as much as may be necessary*. Macerate the violet flowers in water for twelve hours, then press and strain. Set aside, that the fæces may subside, and complete the process as has been ordered concerning Syrup of Marsh-mallows.

Edinburgh.

"Take of fresh violets, *one pound;* boiling water, *two pints and a half;* pure sugar, *seven pounds and a half.* Infuse the flowers for twenty-four hours in the water, in a covered glass or earthenware vessel; strain without squeezing, and dissolve the sugar in the filtered liquor."

Syn. Sirop de Violettes (*F.*), Violen syrup (*G.*), Sciroppo di Viole (*I.*).

This syrup has a deep blue colour, and a very agreeable flavour. The colour, however, which constitutes its chief value, is apt to suffer by keeping; hence the syrup is often counterfeited with materials the colour of which is more permanent, and which are more easily obtained. This fraud is easily detected by adding a little acid or alkali to a portion of the suspected syrup: if it be genuine the acid will change the blue colour to red, and the alkali to green; but if it be counterfeit these changes will not take place, except in the case of the juice of red cabbage being substituted for violets: but in this case the fraud is a very innocent one.

Medical properties and uses. — This syrup acts as a gentle laxative when given to infants. Dose f ʒj. to f ʒ iv.

SYRUPUS ZINGIBERIS, Lond. Edin. Dub. *Syrup of Ginger.*

"Take of ginger, sliced, *two ounces and a half;* boiling distilled water, *a pint;* sugar, *two pounds and a half*, or *as much as may be necessary;* rectified spirit, *as much as may be necessary.* Macerate the ginger root in the water for four hours, press out the liquor, and strain; then complete the process as has been ordered for Syrup of Marsh-mallow."

Edinburgh.

"Take of ginger, *two ounces and a half;* boiling water, *one pint;* pure sugar, *two pounds and a half.* Bruise the ginger, infuse it for four hours in the water, and to the strained liquor add the sugar, and dissolve it with the aid of a gentle heat."

Dublin.

"Take of tincture of ginger, *one fluid ounce;* simple syrup, *seven fluid ounces.* Mix, with agitation."

Syn. Sirop de Gingembre (*F.*), Sciroppo d'Amomo Zenzero (*I.*).

This syrup is moderately stimulant and carminative; and is a useful adjunct to bitter and tonic infusions. Dose, f ʒ j. to f ʒ iv.

PRÆPARATA E SULPHURE.

PREPARATIONS OF SULPHUR.

SULPHUR SUBLIMATUM, Edin. *Sublimed Sulphur.*

"Sublime sulphur in a proper vessel; wash the powder thus obtained with boiling water in successive portions till the water ceases to have an acid taste; then dry the sulphur with a gentle heat."

In the London and Dublin Pharmacopœias, sublimed sulphur is placed in the list of the Materia Medica. According to the London College, it should be "of a lemon colour, is sublimed at the heat of 600° Fahr.; is soluble in oil of turpentine aided by heat."

Syn. Soufre lavé (*F.*), Geevaschner Schwefel (*G.*), Zolfo lavato (*I.*).

In subliming suphur, a small portion of it is apt to be acidified by attracting the oxygen of the heated air of the vessels, or the chamber in which the process is conducted. The quantity is, however, very minute, and is completely removed by the above process. The sulphur does not afterwards undergo any change from exposure to the air at the ordinary temperature of the atmosphere. The equivalent of sulphur is 16. Its medical properties are given under *Sulphur* (Part II.)

AMMONIÆ HYDROSULPHURETUM, Dub. *Hydrosulphuret of Ammonia.*

"Take of solution of ammonia, *four fluid ounces;* sulphuret of iron, *one ounce and a half;* oil of vitriol of commerce, *one fluid ounce and a half;* water, *fifteen ounces;* distilled water, *two ounces.* Place the sulphuret of iron and water in a two-necked bottle, and, adding the oil of vitriol by degrees through a safety funnel, conduct by suitable tubes the sulphuretted hydrogen which is disengaged, first through the distilled water placed in a small intermediate phial, and then to the bottom of a bottle containing the ammonia, the neck of the latter, through which the glass tube conveying the gas passes, being loosely plugged with tow. If, when the development of gas has ceased, a drop of the ammoniacal liquid added to a saturated solution of sulphate of magnesia gives no precipitate, the preparation is completed; but should a precipitate occur, the hydrosulphuret still contains free ammonia,

and must therefore be again subjected to the action of a stream of sulphuretted hydrogen. The hydrosulphuret of ammonia must be kept in a green glass bottle, furnished with an accurately-ground stopper. The specific gravity of this solution is 999."

Mr. Cruikshank[1] advises the sulphuret of iron to be prepared "by raising a piece of iron in a smith's forge to a white heat, and then rubbing it against the end of a roll of sulphur; the iron at this temperature immediately combines with the sulphur, and forms globules of pyrites (*sulphuret of iron*), which should be allowed to drop into a vessel filled with water: these globules are to be reduced to powder, and introduced into the proof, to which a sufficient quantity of the sulphuric acid is to be added." Mr. Wooley, of Manchester, has given the following process for preparing this hydrosulphuret: "Boil one part of sulphur and two parts of hydrate of pure lime in distilled water, and to the filtered solution add sixty-six parts of sulphate of ammonia for every sixteen parts of sulphur used. Sulphate of lime is precipitated, and hydrosulphuret of ammonia remains in solution."[2]

Qualities. — Hydrosulphuret of ammonia is of a green colour; has a very fetid odour, and an acrid, disagreeable taste. It is decomposed by acids, with the evolution of sulphuretted hydrogen, and the precipitation of sulphur. It appears to be a double sulphuret of ammonium and hydrogen, or a compound of hydrosulphuret of ammonia and hydrosulphuric acid. Formula $NH_4\,S + HS$, or $NH_3\,HS + HS$.

Medical properties and uses. — This preparation is a powerful sedative, lessening the action of the stomach and of the arterial system in a remarkable degree; and even in moderate doses producing excessive thirst, nausea, vomiting, and vertigo. It was first proposed as a remedy by Mr. Cruikshank, with the view of diminishing the morbid appetite and powerful action of the digestive organs, which attend those labouring under diabetes mellitus; and its subsequent use has been almost confined to the treatment of that disease. The dose, to an adult, should not at first exceed ♏iij. or ♏iv., given in a large tumbler of water, three or four times a day; and the number of drops should be gradually increased until a slight degree of giddiness take place, when any further increase must be stopped.

SULPHURIS IODIDUM, Lond. SULPHUR IODATUM, Dub. *Iodide of Sulphur.*

"Take of sulphur, *one ounce;* iodine, *four ounces.* Put the sulphur in a glass vessel and place on it the iodine. Hold the vessel immersed in boiling water, until they have united. After-

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[1] *Rollo on Diabetes and Lues Venerea.*
[2] *Pharm. Journ. and Trans.* vol. ii. p. 655.

wards, when it has cooled, the vessel being broken, break the iodide into fragments, and keep in another vessel well stopped."

Dublin.

"Take of pure iodine, in powder, *one ounce;* sublimed sulphur, *two drachms.* Mix the iodine and sulphur by trituration in a mortar, and having transferred the powder to a Florence flask, heat it gently till fusion is effected. When the flask has cooled, let it be broken in order to the withdrawal of the product, which should be immediately enclosed, and preserved in a well-stopped bottle."

These processes consist simply in directly uniting iodine and sulphur with each other by the aid of heat. The relative proportions of the two constituents are the same in both formulas.

Qualities. — Iodide of sulphur occurs in the form of masses resulting from fusion, of a dark bluish-black colour, and metallic lustre, its fracture appears crystalline, and radiated. It has the odour of iodine, stains the cuticle yellow, and possesses a strong acrid taste. It is readily decomposed by heat, even by the long continued action of boiling water. It is stated by the London College, that "from 100 grains of this, when long boiled in water, a residue of 20 grains of sulphur is obtained." Probably it is a bisulphuret of iodine. Formula $I\ S_2$.

Medical properties and uses. — This preparation is only used as a local application. It acts as a stimulant and alterative, and has been employed in the treatment of various chronic and other affections, as lupus, porigo, lepra, psoriasis, &c.

Officinal preparation. — *Unguentum Sulphuris Iodidi*, L.

TINCTURÆ.

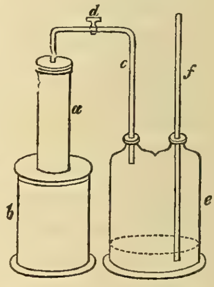
TINCTURES.[1]

THE term tincture is usually, although improperly, applied to spirituous solutions of such of the proximate principles of vegetables and animals as are soluble in rectified spirit, or in proof spirit. From vegetable matter submitted to its action, rectified spirit takes up *sugar, resin, extractive, the alkaloids and allied*

[1] Arnold de Villa Nova, who was professor of medicine at Montpellier about the end of the 13th century, first employed alcohol to dissolve vegetable matter; and thence invented tinctures. The term *tincture* is a bad one, as, strictly speaking, it means a solution prepared for dyeing. Spirituous solutions would be more appropriate.

principles, volatile oils, camphor, tannin, most vegetable acids, &c.; proof spirit also takes up the whole of these partially, and is, besides, the proper menstruum for gum resins; so that alcohol, either in a concentrated or diluted form, is capable of separating the greater part of the active principles of vegetables from the ligneous inert fibres. The tinctures obtained from animal substances are very few in number, and the principles taken up by the spirit are analogous to those enumerated above, belonging to the vegetable kingdom. Rectified spirit is required in a very few instances only for the formation of tinctures, proof spirit being adequate for almost every purpose. The dilution of the spirit, however, must be varied according to the known principles of the substance to be submitted to its action: when resin predominates, it must necessarily be more concentrated; when gum resin or extractive is the most abundant constituent, proof spirit then must be employed. In consequence of the great affinity of water for alcohol, the addition of it to alcoholic tinctures separates the resin, camphor, and volatile oils they contain; but water is generally miscible with tinctures made with proof spirit, without producing any decomposition. Tinctures are not liable to suffer spontaneous decomposition, as is the case with infusions and decoctions; and, independent of the loss which takes place from the evaporation of the spirit and the volatile oils, if the bottles containing tinctures be closely corked, they may be kept for an indefinite length of time, and their virtues remain unimpaired.

Tinctures are prepared in two ways: first, by macerating the ingredients in the spirit in a temperature not exceeding 80°, at which degree, by allowing the menstruum to remain on the ingredients for a sufficient length of time, all the principles that can prove useful in the tincture are extracted, and the solvent saturated: secondly, by percolation. This is performed by means of a long conical or cylindrical tube (see fig. Part I. p. 47.), into which the ingredients are put, after they are moistened with the spirit intended to be employed, and the remainder of the spirit poured over them. The spirit passes through the whole of the materials, and carries with it all the soluble matters; so that a strong tincture is obtained in much shorter time than when the ordinary mode is employed. It is occasionally requisite to employ pressure, for which purpose the following apparatus is well adapted. The ingredients are put into *a*, a cylinder closely fitted into the lid of *b*, a cylindrical vessel for receiving



tincture: *c* is a curved tube, furnished with a stop-cock, *d*, and soldered into the cover of *a*, which screws on; whence it passes and enters one of the tubular orifices of the bottle *e*, which has

another long tube, *f*, fitted to its other orifice. Into *f* mercury or water is poured, so as to condense the air in the bottle, and enable it to act, as a compressing power, on the ingredients contained in *a*.[1] The ingredients must be dried, and reduced to a moderately coarse powder, and the maceration made in close vessels, and assisted by frequent agitation: or the percolation proceeded with as already detailed. When completely made, tinctures should not be allowed to remain upon the ingredients, if they have been made by maceration, but they should be filtered through bibulous paper, and kept in this state in well-corked bottles. Parmentier[2] has proposed that one half only of the spirituous menstruum be added to the ingredients at first; and, after digesting for six days, this part is to be poured off, and the remainder added. In six more the whole is to be strongly expressed, and the two portions of tincture mixed together. By this method he imagines more of the active principles of the ingredients are extracted, and the tinctures obtained of a more uniform strength. But the process of percolation renders this unnecessary; and it is now adopted by the Edinburgh College.

Tinctures are not of very extensive use as remedies, except in cases where stimulants are indicated; the solvent, even in doses of a few fluid drachms, often acting more powerfully on the living system than the principles it holds in solution. In ordinary cases, this action, when continued for some time, produces the same deleterious effects as the habitual use of ardent spirits; and often lays the foundation of the pernicious custom of dram-drinking. When the action of a substance is the reverse of stimulant, it cannot with propriety be exhibited in this form, unless the dose be so small that the operation of the spirit cannot be taken into account, as in tincture of foxglove. The chief use of this class of preparations, therefore, is to enable infusions and decoctions, to which they are added, to sit lighter on the stomach, or to add to them some active principle which water is incapable of extracting. They are also useful as means of preserving the active ingredients of drugs without alteration.

The general rule given in the London Pharmacopœia for the preparation of tinctures is "to prepare them in closed vessels, and to shake them frequently during the maceration." The Edinburgh College directs them to be prepared either by maceration or by percolation.

TINCTURA ACONITE, Lond. Dub. *Tincture of Aconite.*

"Take of aconite root, coarsely powdered, *fifteen ounces;* rectified spirit, *two pints.* Macerate for seven days, press and filter."

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[1] *Christison's Dispensatory.* [2] *Annales de Chimie*, lxii. 40.

Dublin.

"Take of aconite root, dried and cut small, *ten ounces;* rectified spirit, *one pint.* Macerate for fourteen days, strain, express and filter."

It is much to be regretted that these tinctures differ so much in strength, neither of them are so strong as Dr. Fleming's, which has been lately much used. The London preparation is not sufficiently strong for an external application.

Dose of London tincture, ♏v. to ♏x. Dose of Dublin tincture, ♏iij. to ♏vi.

Great precautions are necessary in using aconite internally, as not unfrequently great depression of the heart's action is induced.

TINCTURA ALOES, Lond. Edin. *Tincture of Aloes.*

"Take of socotrine or hepatic aloes, coarsely powdered, *an ounce;* extract of liquorice, *three ounces;* distilled water, *a pint and a half;* rectified spirit, *half a pint.* Macerate the aloes in the spirit mixed with the water for seven days, then add the extract, that it may dissolve, and strain."

Edinburgh.

"Take of aloes (socotrine or Indian), in coarse powder, *one ounce;* extract of liquorice, *three ounces;* rectified spirit, *twelve fluid ounces;* water, *one pint and eight fluid ounces.* Mix them, and digest for seven days, with occasional agitation; filter the clear liquor, separated from the sediment. This tincture cannot, without difficulty and delay, be prepared by percolation."

Syn. Teinture d'Aloës (*F.*), Tinctura d'Aloe (*I.*).

This may be regarded rather as an aqueous solution than a tincture, the quantity of spirit being too small to serve any other purpose than that of preventing decomposition. It may be used in the same cases as the extract of aloes; but notwithstanding the presence of the liquorice, the bitterness of the aloes is so intense and disagreeable, as to prevent it from being often prescribed. Its dose is from f℥ss. to f℥jss.

TINCTURA ALOES COMPOSITA, Lond. TINCTURA ALOES ET MYRRHÆ, Edin. *Compound Tincture of Aloes.*[1] *Tincture of Aloes and Myrrh.*

"Take of socotrine or hepatic aloes, coarsely powdered, *four ounces;* saffron, *two ounces;* tincture of myrrh, *two pints.* Macerate for seven days, and strain."

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[1] Elixir Proprietatis, P. L. 1720.

Edinburgh.

"Take of aloes (socotrine or Indian), in coarse powder, *four ounces;* saffron, *two ounces;* tincture of myrrh, *two pints.* Digest for seven days, and filter the clear superincumbent liquor. This tincture cannot be well prepared by percolation."

Syn. Alcohol avec l'Aloë et la Myrrhe (*F.*), Alcoole Aloë Mirrato (*I.*).

This tincture, which differs in little, except the solvent, from the former, may be used in the same cases. It resembles the *elixir proprietaris* of Paracelsus, and the old Pharmacopœias. It is occasionally used as a local stimulant to foul ulcers. The dose is from fʒj. to fʒij.

TINCTURA AMMONIÆ COMPOSITA, Lond. *Compound Tincture of Ammonia.*

"Take of mastick, *two drachms;* rectified spirit, *nine fluid drachms;* oil of lavender, *fourteen minims;* strong solution of ammonia, *a pint.* Macerate the mastick in the spirit, that it may be dissolved, and decant the clear tincture; then add the other articles, and shake all together."

Medical properties and uses. — This tincture is stimulant and antispasmodic: but it is seldom used; it formerly contained a little oil of amber, and resembled the Eau de Luce; it possesses no advantages over the aromatic spirit of ammonia. The Eau de Luce is regarded almost as a specific for the bite of the Cobra de Capella. The dose is from ♏ v. to ♏ x., in a glassful of water.

TINCTURA ASSAFŒTIDÆ, Lond. Edin. Dub. *Tincture of Assafœtida.*

"Take of assafœtida, in small fragments, *five ounces;* rectified spirit, *two pints.* Macerate for seven days, and strain."

("This tincture cannot be made by percolation without delay," *E.*)

Dublin.

"Take of assafœtida, in small fragments, *five ounces;* rectified spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

Syn. Teinture d'Assafœtide (*F.*), Ascande tinkture (*G.*), Alcoole asfetidato (*I.*).

When this tincture is added to water or aqueous infusions, it renders them of a milky hue, but it is long before the separation of the oleo-resin takes place. It is given in the same cases as crude assafœtida, in doses of fʒj. or more.

TINCTURA AURANTII, Lond. Edin. Dub. *Tincture of Orange-peel.*

"Take of dried orange-peel, *three ounces and a half* (*four ounces,*

D.); proof spirit, *two pints.* Macerate for seven days (fourteen days, *D.*); then express and filter." ("This tincture may be prepared by percolation, by cutting the peel into small fragments, macerating it in a little of the spirit for twelve hours, and beating the mass into a coarse pulp before putting it into the percolator," *E.*)

Syn. Pomeranzan schalen tinktur (*G.*).

This tincture is not decomposed by water, and may therefore be added to infusions and decoctions, to which it is a useful adjunct in dyspepsia.

TINCTURA BELLADONNÆ, Lond. Dub. *Tincture of Belladonna.*

"Take of dried belladonna, *four ounces;* proof spirit, *two pints.* Macerate for seven days, express, and filter."

Dublin.

"Take of belladonna leaves, dried and in coarse powder, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

This is a useful tincture, and is now introduced into the London Pharmacopœia; formerly no solution of belladonna was ordered by the London College.

The dose of this tincture will be from ♏ iv. to ♏ viij., or until symptoms of the belladonna evince themselves. It may also be applied externally when diluted with water.

TINCTURA BENZOINI COMPOSITA, Lond. Edin. *Compound Tincture of Benzoin.*

"Take of benzoin, coarsely powdered, *three ounces and a half;* storax balsam, strained, *two ounces and a half;* balsam of Tolu, *ten drachms;* socotrine or hepatic aloes, coarsely powdered, *five drachms;* rectified spirit, *two pints.* Macerate for seven days, and filter."

Syn. Teinture de Benzoin composée (*F.*), Zusammengesitzte Benzoe tinktur (*G.*), Teintura del Commendatore; Alcoole Benzoato composito (*I.*).

Edinburgh.

"Take of benzoin, in coarse powder, *four ounces;* Peru balsam, *two ounces and a half;* East Indian aloes, *half an ounce;* rectified spirit, *two pints.* Digest for seven days; pour off the clear liquor, and filter it."

This tincture is a stimulating expectorant, and as such is sometimes prescribed in chronic bronchitis and old asthmatic cases; but it is chiefly employed as an external application to wounds and

languid ulcers, which it gently stimulates, and shields from the action of the air. It is decomposed by water, and, therefore, when given internally, must be triturated with yolk of egg or with mucilage, to suspend it in aqueous fluids. Its dose is from fʒss. to fʒij. or more. It was formerly much used as an external application to incised wounds, &c., and is often called *Friar's Balsam.*

TINCTURA BUCKU, Edin. Dub. *Tincture of Bucku.*

"Take of bucku, *five ounces;* proof spirit, *two pints.* Digest for seven days (fourteen days, *D.*), pour off the clear liquor, and filter it."

("This tincture may be conveniently and quickly made also by the process of percolation," *E.*)

The spirit takes up the volatile oil and bitter matter. The tincture possesses the diuretic properties of the leaves of the bucku. The dose is from fʒj. to fʒiv. in water, or the infusion of the bucku leaves.

TINCTURA CALUMBÆ, Lond. Edin. Dub. *Tincture of Calumba.*

"Take of calumba root, finely sliced (in small fragments, if by percolation, in moderately fine powder, *E.*), *three ounces;* proof spirit, *two pints.* Macerate for seven days, and filter."

The Edinburgh orders it to be made also by percolation, allowing the powder to soak in a little of the spirit for six hours before putting it into the percolator.

Dublin.

"Take of calumba root, in coarse powder, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

Proof spirit is the proper menstruum of calumba. The tincture is a useful addition to stomachic infusions and decoctions. It contains the active principles of the root.

TINCTURA CAMPHORÆ, Edin. Dub. *Tincture of Camphor.*

"Take of camphor, in small fragments, *two ounces and a half;* rectified spirit, *two pints.* Dissolve the camphor in the spirit."

Dublin.

"Take of camphor, in small fragments, *an ounce;* rectified spirit, *eight fluid ounces.* Dissolve the camphor in the spirit."

By the London College this is again called *Spiritus Camphoræ:* it was the *Tinctura Camphoræ* of 1836. (See *Spiritus Camphoræ.*)

As it is decomposed by water, it can only be used as an external stimulant. It is a bad form of using camphor for any purpose.

TINCTURA CAMPHORÆ COMPOSITA, Lond. *Compound Tincture of Camphor.*

"Take of camphor, *two scruples and a half;* opium, powdered, benzoic acid, of each, *seventy-two grains;* oil of aniseed, *a fluid drachm;* proof spirit, *two pints.* Macerate for seven days, and filter."

TINCTURA OPII CAMPHORATA, Edin. Dub. *Camphorated Tincture of Opium* (*Paregoric Elixir*).

"Take of camphor, *two scruples and a half;* opium, sliced, and benzoic acid, *four scruples;* oil of anise, *one fluid drachm;* proof spirit, *two pints.* Digest for seven days, then filter."

Dublin.

"Take of opium, in coarse powder; benzoic acid, of each, *a drachm and a half;* camphor, *one drachm;* oil of anise, *one fluid drachm;* proof spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

Syn. Teinture camphrée d'Opium (*F.*), Opiums tinktur mit Benzoe (*G.*).

Half a fluid ounce of this tincture of all the Pharmacopœias, contains about a grain of opium. The tincture differs little from that which has been long known under the titles *Paregoric Elixir* and *Asthmatic Elixir.* It is a useful anodyne in chronic asthma, hooping-cough, and chronic bronchitis, after the inflammatory symptoms have abated; in which it contributes to allay the tickling which induces the frequent cough. The dose is from f ʒ j. to f ʒ ij., or f ʒ iij. in cases where quiet, rather than sleep, is required.

TINCTURA CANNABIS INDICÆ, Dub. *Tincture of Indian Hemp.*

"Take of purified extract of Indian hemp, *half an ounce;* rectified spirit, *half a pint.* Dissolve the extract in the spirit."

This tincture is a convenient form for giving the remedy, but it is precipitated by water; a few drops of liquor potassæ or liquor ammoniæ will, however, keep the resin in solution, without injuring the power of the drug. Rather less than one grain of extract is contained in ♏ xx. of the tincture. Dose ♏ xx. to f ʒ j.

TINCTURA CANTHARIDIS, Lond. Edin. Dub. *Tincture of Blistering Fly.*

"Take of blistering flies, bruised, *four drachms;* proof spirit, *two pints.* Macerate for seven days, express, and filter."

Edinburgh.

"Take of cantharides, *half an ounce;* proof spirit, *two pints.* Digest for seven days, and express strongly the residuum: filter the liquor. This tincture may be obtained more conveniently and expeditiously by percolation, provided the cantharides be reduced to coarse powder, and left mixed with a little of the spirit for twelve hours before the process of percolation is commenced."

Dublin.

"Take of Spanish flies, in coarse powder, *half an ounce;* proof spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

Syn. Teinture de Cantharides (*F.*), Canthariden tinktur (*G.*), Tintura di Cantaridi (*I.*).

Proof spirit extracts the active matter of the blistering beetle, and is a convenient form for its internal administration.

This tincture is useful in gleets, fluor albus, incontinence of urine, and in lepra, eczema, and some other cutaneous eruptions. The dose is from ♏ x. to f ʒ ss., given in any demulcent. I have frequently carried the dose to f ʒ j., and continued it for several successive weeks. As an external application it is efficaciously employed, in conjunction with *soap* or *camphor liniment,* as an embrocation against rheumatic pains; and I have found that a rag moistened with it is a useful application in spontaneous mortification of the extremities; and to frost-bitten parts.

TINCTURA CAPSICI, Lond. Edin. Dub. *Tincture of Capsicum.*

"Take of bruised capsicum, *ten drachms;* proof spirit, *two pints.* Macerate for seven days, express, and filter."

(" This tincture can be made by percolation," *E.*)

Dublin.

"Take of Cayenne pods, bruised, *one ounce and a half;* proof spirit, *one pint.* Macerate for fourteen days, strain, express, and filter."

This is a convenient form for exhibiting capsicum in atonic dyspepsia, tympanitis, cynanche maligna, the low stage of typhus; and in gargles. The dose is ♏ xij. to f ʒ ss. of London and Edinburgh tincture. A mixture of f ʒ ij. and ℥ viij. of water answers instead of the usual capsicum gargle. The Dublin preparation is more than twice the strength of the other two.

TINCTURA CARDAMOMI, Edin. *Tincture of Cardamoms.*

"Take of the seeds of cardamoms, bruised, *four ounces and a half;* proof spirit, *two pints.* Digest for seven days, strain, squeeze the residuum, and filter the liquors. This tincture may be better prepared by percolation, the seeds being first ground in a coffee mill."

TINCTURA CARDAMOMI COMPOSITA, Lond. Edin. Dub. *Compound Tincture of Cardamoms.*

"Take of cardamoms, caraway seeds, cochineal, of each, in powder, *two drachms and a half;* cinnamon, bruised, *five drachms;* stoned raisins, *five ounces;* proof spirit, *two pints.* Macerate for seven days, press, and filter."

Edinburgh.

In the Edinburgh preparation one drachm only of cochineal is ordered, as in the London tincture of 1836.

Dublin.

"Take of cardamom seeds, bruised, caraway seeds, bruised, of each, *half an ounce;* cinnamon, bruised, *one ounce;* cochineal, in powder, *two drachms;* proof spirit, *three pints.* Macerate for fourteen days, strain, express, and filter."

It may be also prepared by percolation.

These tinctures are agreeable cordials, and form elegant adjuncts to stomachic infusions. Dose f ʒj. to f ʒij.

TINCTURA CASCARILLÆ, Lond. Edin. Dub. *Tincture of Cascarilla.*

"Take of cascarilla, powdered, *five ounces;* proof spirit, *two pints.* Macerate for seven days (fourteen days, *D.*), express, and filter."

("This tincture may also be prepared by percolation," *E.*)

Dose fʒ j. to fʒ ij.; an adjunct to stomachic and tonic infusions.

TINCTURA CASSIÆ, Edin. *Tincture of Cassia.*

"Take of cassia bark, in moderately fine powder, *three ounces and three drachms;* proof spirit, *two pints.* Digest for seven days, strain, express the residuum strongly, and filter. It may be more conveniently made by percolation."

Useful in the same cases for which the tincture of cinnamon is prescribed.

TINCTURA CASTOREI, Lond. Edin. *Tincture of Castor.*

"Take of castor, powdered, *two ounces and a half;* rectified

spirit, *two pints.* Macerate for seven days, express, and filter. (This tincture may be made by percolation, *E.*)"

Syn. Teinture de Castor (*F.*), Castoreumstinktur (*G.*), Tintura di Castoro (*I.*).

Rectified spirit is the preferable solvent of castor, which contains resin and a volatile oil; and it also affords a more grateful tincture than that made with proof spirit. The tincture is supposed to possess any medical properties which the castor possesses. The dose is from ♏xx. to f℥ij.

A few drops of the tincture of castor dropped into distilled water produces a milky mixture, which is again cleared by the addition of ammonia.

TINCTURA CASTOREI AMMONIATA, Edin. *Ammoniated Tincture of Castor.*

"Take of castor, bruised, *two ounces and a half;* assafœtida, in small fragments, *ten drachms;* spirit of ammonia, *two pints.* Digest for seven days in a well-closed vessel; strain, and express strongly the residuum, and filter the liquor. This tincture cannot be conveniently prepared by the method of percolation."

This is a more active preparation than the former, and is advantageously given in hysteria, cramp of the stomach, and flatulent colic, to the extent of f℥ij. for a dose.

TINCTURA CATECHU COMPOSITA[1], Lond. *Compound Tincture of Catechu.*

"Take of powdered catechu, *three ounces and a half;* cinnamon, bruised, *two ounces and a half;* proof spirit, *two pints.* Macerate for seven days, and filter.

TINCTURA CATECHU, Edin. Dub. *Tincture of Catechu.*

"Take of catechu, in moderately fine powder, *three ounces and a half;* cinnamon, in fine powder, *two ounces and a half;* proof spirit, *two pints.* Digest for seven days; strain, and express strongly the residue, and filter the liquor. It may be prepared by the percolator."

Dublin.

"Take of catechu, in coarse powder, *four ounces;* cinnamon, bruised, *two ounces;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter.

Syn. Teinture de Cachou (*F.*), Katechutinktur (*G.*).

Proof spirit dissolves all the soluble parts of catechu, except the

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[1] Tinctura Japonica, P. L. 1745. Tinctura Catechu, P. L. 1836.

mucilage, which in ℥ iijss. of Bengal catechu amounts to 110 grains; besides which 84 grains of impurities remain undissolved. The tincture is a solution of catechuic acid, extractive, and the volatile oil of cinnamon. It is a grateful, warm astringent, useful in all cases in which astringents are indicated. The dose is from f℥j. to f℥iij.

TINCTURA CHIRETTA, Dub. *Tincture of Chiretta.*

"Take of chiretta, bruised, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

Dose f℥ss. to f℥ij. It is used in the same cases in which tincture of gentian is employed.

TINCTURA CINCHONÆ[1], Lond. Edin. Dub. *Tincture of Cinchona.*

"Take of yellow cinchona, in powder, *eight ounces;* proof spirit, *two pints.* Macerate for seven days; express and filter."

Edinburgh.

"Take of yellow bark (or of any other species of cinchona, according to prescription), in fine powder, *eight ounces;* proof spirit, *two pints.* Percolate the bark with the spirit, the bark being previously moistened with a very little spirit, left thus for ten or twelve hours, and then firmly packed in the cylinder. This tincture may also be prepared, though much less expeditiously, and with much greater loss, by the usual process of digestion, the bark being in that case reduced to coarse powder only."

Dublin.

"Take of Peruvian bark, crown or pale, in coarse powder, *eight ounces;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

TINCTURA CINCHONÆ PALLIDÆ, Lond. *Tincture of Pale Bark.*

Prepared in the same way as the Tincture of Cinchona, Lond.

Syn. Teinture de Quinquina (*F.*), Chinatinktur (*G.*), Tintura di China (*I.*).

Although these tinctures contain the active principles of the cinchona bark used in considerable quantity, yet from the nature of the vehicle they cannot be given in sufficiently large doses to produce the beneficial effects of the bark in substance; they are therefore used chiefly as adjuncts to the infusion or decoction. The dose is from f℥j. to f℥iv.

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[1] Tinctura corticis Peruvianæ simplex, P. L. 1745.

TINCTURA CINCHONÆ COMPOSITA, Lond. Edin. Dub. *Compound Tincture of Cinchona.*

"Take of pale cinchona, powdered (yellow bark in coarse powder, fine if percolation be followed, *Edin.*), *four ounces;* bitter orange-peel, *three ounces;* serpentaria, bruised, *six drachms;* saffron, *two drachms;* cochineal, in powder, *a drachm;* proof spirit, *two pints.* Macerate for seven days, and filter."

Dublin.

"Take of Peruvian bark, crown or pale, in coarse powder, *four ounces;* bitter orange-peel, dried, *two ounces;* Virginian snake root, bruised, *six drachms;* saffron, chopped fine, *two drachms;* cochineal, in powder, *one drachm;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

Syn. Zusammengesetzte Chinatinktur (*G.*).

This tincture may be prepared by percolation; it is more grateful than the former: and although it contains less cinchona, yet the addition of the other ingredients renders it more useful both as a stomachic and a tonic. It is the same as the celebrated *Tincture of Huxham*[1], who generally gave it in intermittents, and low nervous fevers, in diluted wine or any proper vehicle, with ten or fifteen drops of elixir of vitriol (aromatic sulphuric acid, *Edin.*). The dose is from f ʒj. to f ʒiij. or more.

TINCTURA CINNAMOMI, Lond. Edin.[2] *Tincture of Cinnamon.*

"Take of cinnamon, bruised (in moderately fine powder, *E.*), *three ounces and a half;* proof spirit, *two pints.* Macerate for seven days, express, and filter." (Proceed by percolation or digestion, as directed for tincture of cassia, *E.*)

Syn. Teinture de Canelle (*F.*), Zimmttinktur (*G.*), Tintura di Cinnamomo (*I.*).

This tincture contains the active principles of the bark, and is an elegant and useful adjunct to astringent infusions. The dose is from f ʒj. to f ʒij.

TINCTURA CINNAMOMI COMPOSITA[3], Lond. Edin. Dub. *Compound Tincture of Cinnamon.*

"Take of cinnamon, bruised, *an ounce;* cardamoms, bruised, *half an ounce;* long pepper, powdered, ginger, sliced, of each, *two drachms and a half;* proof spirit, *two pints.* Macerate for seven days, express, and filter."

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[1] *Essay on Fever*, 122.

[2] Aqua cinnamomi fortis, P. L. 1720.

[3] Tinctura aromatica, P. L. 1745.

Edinburgh.

"Take of cinnamon, in coarse powder (fine if percolation be followed), and cardamom seeds, bruised, of each, *one ounce;* long pepper, ground finely, *three drachms;* proof spirit, *two pints.* This tincture is best prepared by the method of percolation as directed for the compound tincture of cardamom; but it may also be made in the ordinary way by digesting for seven days, straining and expressing the liquor, and then filtering."

Dublin.

"Take of cinnamon, bruised, *two ounces;* cardamom seeds, bruised, *one ounce;* ginger, bruised, *half an ounce;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

This is a much warmer aromatic than the simple tincture; and is frequently advantageously used in flatulencies, atonic gout, and debility, in doses of fʒj. or fʒij., properly diluted.

TINCTURA COCCI CACTI, Dub. *Tincture of Cochineal.*

"Take of cochineal, in fine powder, *two ounces;* proof spirit, *one pint.* Macerate for fourteen days, strain, express and filter."

This tincture is used simply as a colouring agent.

TINCTURA COLCHICI, Lond. Edin. *Tincture of Colchicum.* TINCTURA SEMINUM COLCHICI, Dub.

"Take of the seeds of Colchicum autumnalis, bruised (ground finely, *Edin.*), *five ounces;* proof spirit, *two pints.* Macerate for seven days (fourteen, *D.*); then strain." It may be also prepared by percolation, *E.*

This is a useful form of administering colchicum of a determinate strength. The dose is from ♏xx. to fʒj.

TINCTURA COLCHICI COMPOSITA, *Lond.* *Compound Tincture of Colchicum.*

"Take of colchicum seeds, bruised, *five ounces;* aromatic spirit of ammonia, *two pints.* Macerate for seven days, express, and filter."

This is the ammoniated spirit of colchicum of a former Pharmacopœia; it is less active than the tincture. The dose is from fʒss. to fʒj.

TINCTURA CONII, Lond. Edin. *Tincture of Conium.*

"Take of dried conium, *five ounces;* proof spirit, *two pints.* Macerate for seven days, express, and filter."

Edinburgh.

"Take of fresh conium leaves, *twelve ounces;* tincture of cardamom, *half a pint;* rectified spirits, *a pint and a half.* Bruise the hemlock leaves; express the juice strongly; bruise the residuum; pack it firmly in a percolator; transmit first the tincture of cardamoms, and then the rectified spirit, allowing the spirituous liquors to mix with the expressed juice as they pass through; add, gently, water enough to the percolator for pushing through the spirit remaining in the residuum. Filter the liquor after agitation."

The cardamoms are now properly omitted from the London tincture.

This is an elegant form of administering conium; and admits of its being added to mixtures. It possesses all the active properties of the plant. Dose ♏xx. to f℥j.

TINCTURA CROCI, Edin. Dub. *Tincture of Saffron.*

"Take of saffron, chopped fine, *two ounces;* proof spirit, *two pints.* This tincture is to be prepared like tincture of cinchona, either by percolation or by digestion, the former method being the more convenient and expeditious."

Dublin.

"Take of saffron, chopped fine, *two ounces;* proof spirit, *one pint.* Macerate for fourteen days; strain, express, and filter."

Syn. Teinture de Saffron (*F.*).

This tincture contains volatile oil, extractive, and the colouring matter of the saffron. It is stimulant and diaphoretic, but its chief value perhaps arises from its colour. Dose f℥j. to f℥ij.

TINCTURA CUBEBÆ, Lond. Dub. *Tincture of Cubebs.*

"Take of cubebs, bruised, *a pound;* proof spirit, *two pints.* Macerate for fourteen days; then express and filter."

Dublin.

"Take of cubebs, bruised, *five ounces;* rectified spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

The strength of the London preparation is now more than doubled, and proof spirit ordered in the place of rectified. Dose of London preparation, f℥j. and upwards; of Dublin tincture, f℥ij. and upwards.

TINCTURA CUSPARIÆ, Edin. *Tinctura of Cusparia.*

"Take of cusparia, in moderately fine powder, *four ounces and a half;* proof spirit, *two pints.* This tincture is to be made like the tincture of cinchona, and most expeditiously by percolation."

Syn. Teinture d'Angusture (*F.*).

This tincture, which contains the active principles of the cusparia bark, is given in doses of fʒj. or fʒij., in the same cases as the bark.

TINCTURA DIGITALIS, Lond. Edin. Dub. *Tincture of Foxglove.*

"Take of foxglove leaves, dried, *four ounces;* proof spirit, *two pints.* Macerate for seven days, express and filter." (This tincture is best prepared by the process of percolation, as directed for the tincture of capsicum. If 40 fluid ounces of spirit be passed through, the density is 944; and the solid contents of a fluid ounce amount to 24 grains. It may also be made by digestion, *E.*)

Dublin.

"Take of foxglove leaves, dried and in coarse powder, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

Syn. Teinture de Digitale (*F.*), Fingerhautinktur (*G.*), Tintura di Digitale porporrina (*I.*).

This is one of the best and most convenient forms for exhibiting foxglove; it has the advantage of preserving its virtues unimpaired for any length of time. The dose should be ♏x. at first, and gradually increased, the same caution being necessary as in the exhibition of the plant in substance.

TINCTURA ERGOTÆ, Dub. *Tincture of Ergot.*

"Take of ergot of rye, in coarse powder, *eight ounces;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

Dose, ♏xx. to fʒj. or fʒij.

TINCTURA ERGOTÆ ÆTHEREA, Lond. *Etherial Tincture of Ergot.*

"Take of bruised ergot, *fifteen ounces;* ether, *two pints.* Macerate for seven days, then express and filter."

These tinctures contain the active principles of the drug. Dose, ♏x. to fʒj.

TINCTURA FERRI ACETATIS, Dub. See *Metallic Preparations.*

TINCTURA FERRI AMMONIO-CHLORIDI. Lond. See *Metallic Preparations.*

TINCTURA FERRI SESQUICHLORIDI, Lond. See *Metallic Preparations.*

TINCTURA GALLÆ, Lond. Dub. TINCTURA GALLARUM, Edin. *Tincture of Galls.*

"Take of galls, in powder (fine, *E.*), *five ounces;* proof spirit, *two pints.* Macerate for seven days (fourteen, *D.*); then express and filter." (This tincture may be made either by digestion or percolation, as directed for tincture of capsicum, *E.*).

Proof spirit dissolves both tannic and gallic acids; consequently this tincture contains all the astringency of the galls. It is fully as useful as Ruspini's Styptic, which is a solution of gallic acid in weak spirit, with minute quantities of sulphate of zinc and extract of opium.[1] The dose of this tincture is from ♏xx. to f℥ij.

TINCTURA GENTIANÆ COMPOSITA[2], Lond. Edin. Dub. *Compound Tincture of Gentian.*

"Take of gentian root, sliced, *two ounces and a half;* orange-peel, dried, *ten drachms;* cardamoms, bruised, *five drachms;* proof spirit, *two pints.* Macerate for seven days, press and filter."

Edinburgh.

"Take of gentian, sliced and bruised, *two ounces and a half;* dried bitter orange-peel, bruised, *ten drachms;* canella, in moderately fine powder, *six drachms;* cochineal, bruised, *half a drachm;* proof spirit, *two pints.* Digest for seven days; strain and express strongly; and then filter the liquor. It may be also made by percolation."

Dublin.

"Take of gentian root, bruised, *three ounces;* bitter orange-peel, dried, *one ounce and a half;* cardamom seeds, bruised, *half an ounce;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

Syn. Teinture de Gentiane composée (*F.*), Enziantinktur (*G.*), Tintura di Genziana (*I.*).

This is an elegant stomachic bitter and cordial; but in dyspepsia, in which it is more particularly indicated, the infusion is preferable. Dose, fℨj. to f℥ij.

TINCTURA GUAIACI, Edin. Dub. *Tincture of Guaiacum.*

"Take of guaiacum resin, coarsely powdered, *seven ounces;* rectified spirit, *two pints.* Macerate for seven days, and filter."

[1] Ruspini's styptic is said not to contain either tannic or gallic acids.

[2] Tinctura amara, P. L. 1745.

Dublin.

"Take of guaiac resin, in fine powder, *eight ounces;* rectified spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

Syn. Teinture de Guajac (*F.*), Guajaktinktur (*G.*), Tintura di Guajac (*I.*).

As the resin in this tincture is separated from the spirit by the addition of water, when it is to be given in the form of draught, it must be triturated with yolk of egg, or with mucilage, to enable it to combine with the water. The dose is from fʒj. to fʒiij., in any convenient vehicle.

TINCTURA GUAIACI COMPOSITA[1], Lond. TINCTURA GUAIACI AMMONIATA, Edin. *Compound Tincture of Guaiacum.*

"Take of guaiacum resin, in coarse powder, *seven ounces;* aromatic spirit of ammonia (spirit of ammonia, *E.*), *two pints.* Macerate for seven days, and filter."

Syn. Teinture Ammoniacal de Guajac (*F.*), Ammonium guajaktinktur (*G.*), Alcoole Ammoniato con Guajaco; Tintura Guajachina volatile (*I.*).

As the ammonia coincides with the operation of guaiacum more than spirit, this tincture is more efficacious as a stimulating sudorific than the former preparation. Water decomposes it, separating the guaiacum in dark curdy flakes. Chlorine, nitrous acid, and the spirit of nitric ether separate the guaiacum into curdy coagulated masses, and impart to the whole an intense blue colour: but sulphuric and hydrochloric acids produce no change. Dr. Paris says, "if equal parts of quick-lime and powder of guaiacum be rubbed together, and a quantity of water be poured over them, and the mixture allowed to stand until it become fine, we shall obtain a solution of this substance, which will mix in any proportion with aqueous vehicles without decomposition, and to which the aromatic spirit of ammonia may be subsequently added with effect." The dose is from fʒj. to fʒij., triturated with any viscid matter.

TINCTURA HELLEBORI[2], Lond. *Tincture of Hellebore.*

"Take of the root of (black) hellebore, bruised, *five ounces;* proof spirit, *two pints.* Macerate for seven days; then express and filter."

Syn. Teinture d'Ellebore noir (*F.*), Tintura d'Elleboro (*I.*).

This tincture was regarded by Dr. Mead as a powerful emmenagogue; and it is still sometimes ordered in uterine obstructions,

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[1] Tinc. guaiacina volatilis, P. L. 1745. Tinc. Guaiaci ammoniata, P. L. 1824.
[2] Tinctura melampodii, P. L. 1745. Tinct. Hellebori nigri, P. L. 1824.

and in some cutaneous affections. The dose is from ♏xxx. to fʒj., in any appropriate vehicle.

TINCTURA HYOSCYAMI, Lond. Edin. Dub. *Tincture of Henbane.*

"Take of the dried leaves of henbane, *five ounces;* proof spirit, *two pints.* Macerate for seven days (fourteen days, *D.*), press and filter." (It is best prepared by the process of percolation, *E.*).

This is sometimes a useful substitute for tincture of opium, and does not affect the head or produce costiveness. Dose, fʒss. to fʒij.

TINCTURA JALAPÆ, Lond. Edin. Dub. *Tincture of Jalap.*

"Take of jalap, coarsely powdered, *five ounces;* proof spirit, *two pints.* Digest for seven days; then express and filter."

Edinburgh.

"Take of jalap root, in moderately fine powder, *seven ounces;* proof spirit, *two pints.* This tincture may be prepared either by digestion or percolation, as directed for tincture of cinchona."

Dublin.

"Take of jalap root, in coarse powder, *five ounces;* proof spirit, *one pint and a half.* Digest for fourteen days; then filter."

Proof spirit extracts from jalap the gum, extractive, and resin or *jalapin.* The difference in point of strength of these tinctures is to be regretted. Dose fʒj. to fʒiij.

TINCTURA IODINII COMPOSITA, Lond. Dub. *Compound Tincture of Iodine.*

"Take of iodine, *an ounce;* iodide of potassium, *two ounces;* rectified spirit, *two pints.* Macerate until they are dissolved, and filter."

In the Dublin Pharmacopœia half the quantities are ordered, and the tincture is not filtered.

TINCTURA IODINEI, Edin. *Tincture of Iodine.*

"Take of iodine, *two ounces and a half;* rectified spirit, *two pints.* Dissolve the iodine in the spirit with the aid of heat and agitation. Keep the tincture in well-closed bottles."

These are saturated spirituous solutions of iodine, with the addition of iodide of potassium in the London and Dublin preparations. The tincture of the Edinburgh College is an excellent stimulant in enlarged tonsils when brushed upon the parts; and as a gargle, in the proportion of fʒj. to tincture of opium

fʒj. and water f℥vj., in chronic ulceration of the fauces. This tincture has also proved useful when applied to the diseased portions of the scalp in porrigo. The dose for internal use is from five minims, gradually increased, twice or three times a day. The London and Dublin compound tincture may be given in doses of from ♏x. upwards.

TINCTURA KINO, Lond. Edin. *Tincture of Kino.*

"Take of kino, in powder, *three ounces and a half;* rectified spirit, *two pints.* Macerate for seven days, and strain." (It may be prepared by percolation, *E.*)

Syn. Teinture de Kino (*F.*).

It is administered in chronic diarrhœa, the latter stage of dysentery, fluor albus, and in all cases in which astringents are indicated; but it is less certain in its operation than the tincture of catechu. When the kino of the Eucalyptus is used, the tincture becomes gelatinous when kept, unless, as is now properly directed, rectified spirit be employed. The dose is from fʒj. to fʒij.

TINCTURA KRAMERIÆ, Dub. *Tincture of Rhatany.*

"Take of rhatany root, in coarse powder, *eight ounces;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

A useful astringent. Dose fʒj. to fʒij.

TINCTURA LACTUCARII, Edin. *Tincture of Lactucarium.*

"Take of lactucarium, in fine powder, *four ounces;* proof spirit, *two pints.* This tincture is best prepared by percolation, as directed for the tincture of myrrh; but may also be prepared by digestion with coarse powder of lactucarium."

This tincture possesses narcotic and anodyne properties, and forms a substitute for tincture of opium, in bronchitis and other coughs, when opium disagrees. The dose is ♏xx. to ♏xl.

TINCTURA LAVANDULÆ COMPOSITÆ, Lond. Dub. *Compound Tincture of Lavender.*

"Take of oil of lavender, *a drachm and a half;* oil of rosemary, *ten minims;* bruised cinnamon and nutmegs, *two drachms and a half;* red saunders wood, sliced, *five drachms;* rectified spirit, *two pints.* Macerate the cinnamon, nutmegs, and saunders wood in spirit for seven days, then express, filter, and dissolve the oil in the prepared tincture."

Dublin.

"Take of oil of lavender, *three fluid drachms;* oil of rosemary,

one fluid drachm; cinnamon, bruised, *one ounce;* nutmeg, bruised, *half an ounce;* cloves, bruised, cochineal, in powder, of each, *two drachms;* rectified spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

A useful stimulant in syncope, &c. Dose ♏xx. to f℥j., or f℥jss.

TINCTURA LIMONUM, Lond. TINCTURA LIMONIS, Dub. *Tincture of Lemons.*

"Take of fresh lemon-peel, *three ounces and a half;* proof spirit, *two pints.* Macerate for seven days; then express and filter."

Dublin.

"Take of fresh lemon-peel, cut thin, *five ounces;* proof spirit, *one pint.* Macerate for fourteen days; strain, express, and filter."

The Dublin preparation is much stronger than the London. This tincture possesses all the virtues of the lemon-peel, and is useful as an aromatic. Dose f℥j. to f℥ij.

TINCTURA LOBELIÆ, Lond. Edin. Dub. *Tincture of Lobelia.*

"Take of lobelia, dried, and in moderately fine powder, *five ounces;* proof spirit, *two pints.* Macerate for seven days (fourteen, *D.*), and filter." (This tincture is best prepared by the process of percolation, as directed for the tincture of capsicum; but it may also be made in the usual way by digestion, *E.*).

TINCTURA LOBELIÆ ÆTHEREA, Lond. Edin. *Ethereal Tincture of Lobelia.*

"Take of lobelia, bruised, *five ounces;* ether, *fourteen fluid ounces;* rectified spirit, *twenty-six fluid ounces.* Macerate for seven days; then express and filter."

Edinburgh.

"Take of dry lobelia, in moderately fine powder, *five ounces;* spirit of sulphuric ether, *two pints.* This tincture is best prepared by percolation, as directed for tincture of capsicum; but it may also be obtained by digestion in a well-closed vessel for seven days."

These tinctures are useful modes of administering lobelia. The simple tincture operates as an emetic and antispasmodic, in doses of f℥j. to f℥ij. In smaller doses it operates chiefly as an expectorant.

TINCTURA LUPULI, Lond. Edin. *Tincture of Hops.* TINCTURA LUPULINÆ. Dub. *Tincture of Lupuline.*

"Take of hop, *six ounces;* proof spirit, *two pints.* Macerate for seven days; express and filter."

Edinburgh.

"Take *any convenient quantity* of hops, recently dried; separate by friction, and sifting the yellowish-brown powder attached to their scales. Then take of this powder, *five ounces;* and of rectified spirit, *two pints;* and prepare the tincture by percolation or digestion, as directed for the tincture of capsicum."

Dublin.

"Take of lupuline, *five ounces;* rectified spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

The bulk of the hops renders it difficult to make the quantity of spirit here ordered act equally on them, therefore their surface should be several times changed by stirring, during the maceration, and the tincture expressed. The tincture of the Edinburgh and Dublin Colleges is that of lupuline. Both tinctures possess the tonic and narcotic properties of the plant. The dose is from fʒss. to fʒij., or more.

TINCTURA MATICO, Dub. *Tincture of Matico.*

"Take of matico leaves, in coarse powder, *eight ounces;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

If matico possesses any virtue except those dependent on the mechanical structure of the leaf, this tincture is a useful form of administering the drug. Dose fʒj. to fʒij. See *Artanthe Elongata,* Part II.

TINCTURA MYRRHÆ, Lond. Edin. Dub. *Tincture of Myrrh.*

"Take of powdered myrrh, *three ounces;* rectified spirit, *two pints.* Macerate for seven days, and filter."

Edinburgh.

"Take of myrrh, in moderately fine powder, *three ounces and a half;* rectified spirit, *two pints.* Pack the myrrh very gently without any pressure in a percolator; then pour on the spirit; and when thirty-three fluid ounces have passed through, agitate well to dissolve the oleo-resinous matter, which first passes and which lies at the bottom. This tincture is much less conveniently obtained by the process of digestion for seven days."

Dublin.

"Take of myrrh, bruised, *four ounces;* rectified spirit, *two pints.* Digest for fourteen days; strain, express, and filter."

Syn. Teinture de Myrrhe (*F.*), Myrrhentinktur (*G.*), Tintura de Mirra (*I.*).

This tincture is tonic and deobstruent; but it is more generally used in gargles, combined with infusion of roses and acids; or as an application to foul ulcers, and exfoliating bones; or, diluted with water, as a wash for the mouth, when the gums are spongy. The dose is from f℥ss. to f℥j.

TINCTURA OPII, Lond. Edin. Dub. *Tincture of Opium.*

"Take of opium, powdered, *three ounces;* proof spirit, *two pints.* Macerate for seven days, then express and filter."

Edinburgh.

"Take of opium, sliced, *three ounces;* rectified spirit, *one pint and seven fluid ounces;* water, *thirteen fluid ounces and a half.* Digest the opium in the water at a temperature near 212° for two hours; break down the opium with the hand; strain and express the infusion; macerate the residuum in the rectified spirit for about twenty hours, and then strain and express very strongly. Mix the watery and spirituous infusions, and filter.

"This tincture is not easily obtained by the process of percolation; but when the opium is of fine quality it may be prepared thus: Slice the opium finely; mix the spirit and water; let the opium macerate in fourteen fluid ounces of the mixture for twelve hours, and then break it down thoroughly with the hand; pour the whole pulpy mass and fluid into a percolator, and let the fluid part pass through; add the rest of the spirit without packing the opium in the cylinder, and continue the process of percolation till two pints are obtained."

Dublin.

"Take of opium, in coarse powder, *three ounces;* proof spirit, *two pints.* Digest for fourteen days; then strain, express, and filter.

Syn. Teinture d'Opium (*F.*), Opiums-tinktur (*G.*), Laudano liquido; Alcoole opiato (*I.*).

"One grain of opium is contained in about thirteen or fourteen minims of the London and Edinburgh tinctures; the Dublin tincture is rather weaker, as the avoirdupois weights are employed. This tincture may be used in all cases in which opium is indicated, and is a very convenient and elegant form of giving the remedy.[1] The usual dose is from ♏ x. to ♏ xx.; but in some morbid states of the habit very large doses can be borne, and are even necessary. In colica pictonum f℥j. given before using purges facilitates their action, and renders the relief more speedy: in tetanus, so much as f℥vss. have been given in many divided

[1] It ought to be kept in opaque bottles; as light, according to the experiments of Vogel, has the power of decomposing it. Vide *Journ. de Pharm.* Mai, 1815, p. 199.

doses, with advantage, in twenty-six hours.[1] As an external application, this tincture rubbed upon the skin produces its anodyne effects in a smaller degree, allays local pains, and assists in relaxing the spasm in lock-jaw and similar affections.

TINCTURA OPII AMMONIATA, Edin. *Ammoniated Tincture of Opium.*

"Take of benzoic acid and saffron, chopped, *six drachms* of each; opium, sliced, *half an ounce;* oil of anise, *a drachm;* spirit of ammonia, *two pints.* Digest for seven days, and then filter."

This tincture is a bad preparation. Eighty minims contain gr. j. of opium, or as much of it as the menstruum will take up.

TINCTURA OPII CAMPHORATA, Edin. Dub. See *Tinctura Camphoræ Composita.*

TINCTURA QUASSIÆ, Edin. *Tincture of Quassia.*

"Take of quassia chips, *ten drachms;* proof spirit, *two pints.* Digest for seven days, and filter."

Syn. Teinture de Quassia (*F.*).

TINCTURA QUASSIÆ COMPOSITA, Edin. *Compound Tincture of Quassia.*

"Take of cardamom seeds, bruised, and cochineal, bruised, of each, *half an ounce;* cinnamon, in moderately fine powder, and quassia, in chips, of each, *six drachms;* raisins, *seven ounces;* proof spirit, *two pints.* Digest for seven days, strain the liquor, express strongly the residuum, and filter. This tincture may also be obtained by percolation, as directed for the compound tincture of cardamom, provided the quassia be rasped or in powder."

These tinctures contain the bitter of the wood in perfection, and may be used in the same cases as the infusion. The addition of the aromatics in the compound tincture is an advantage in many cases. Dose f℥j. to f℥iij.

TINCTURA QUINÆ COMPOSITA, Lond. *Compound Tincture of Quinine.*

"Take of disulphate of quina, *five drachms and a scruple;* tincture of orange-peel, *two pints.* Digest for seven days, or until it dissolves, and filter."

The tincture of orange-peel does not quite dissolve the quinine. Mr. Squire finds that in seven days $\frac{3}{4}\frac{9}{0}$ths are taken up. It is an elegant and useful preparation. Dose, f℥j. to f℥ij., or more in cases where disulphate of quinine is indicated.

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[1] *Currie's Report on Cold Water,* i. 138.

TINCTURA RHEI, Edin. *Tincture of Rhubarb.*

"Take of rhubarb, in moderately fine powder, *three ounces and a half;* cardamom seeds, bruised, *half an ounce;* proof spirit, *two pints.* Mix the rhubarb and cardamom seeds, and proceed by the process of percolation as directed for tincture of cinchona. This tincture may be also prepared by digestion."

Syn. Teinture de Rhubarbe (*F.*), Rhabarbertinktur (*G.*), Tinctura de Rhabarbaro (*I.*).

TINCTURA RHEI COMPOSITA, Lond. Dub. *Compound Tincture of Rhubarb.*

"Take of rhubarb root, sliced, *two ounces and a half;* fresh liquorice, bruised, *six drachms;* ginger, sliced, saffron, of each, *three drachms;* proof spirit, *two pints.* Macerate for fourteen days, and then express and filter."

Dublin.

"Take of rhubarb root, bruised, *three ounces;* cardamom seeds, bruised, *one ounce;* liquorice root, bruised, *half an ounce;* saffron, chopped fine, *two drachms;* proof spirit, *two pints.* Macerate for fourteen days, strain, express, and filter."

TINCTURA RHEI ET ALOES, Edin. *Tincture of Rhubarb and Aloes.*

"Take of rhubarb, in moderately fine powder, *one ounce and a half;* Socotorine or East Indian aloes, in moderately fine powder, *six drachms;* cardamom seeds, bruised, *five drachms;* proof spirit, *two pints.* Mix the powders, and proceed as for the tincture of cinchona."

Syn. Alcohol avec Aloë et Rhubarbe (*F.*), Alcoole Aloe-Rabarbarato (*I.*).

TINCTURA RHEI ET GENTIANÆ, Edin. *Tincture of Rhubarb and Gentian.*

"Take of rhubarb, in moderately fine powder, *two ounces;* gentian, finely cut or in coarse powder, *half an ounce;* proof spirit, *two pints.* Mix the powders, and proceed as for the tincture of cinchona."

All these tinctures of rhubarb are purgative and stomachic; but the strength of the menstruum is too great to permit of their general use for the first intention, and they are more usually employed as adjuncts to saline purgatives, to give them warmth, or to stomachic infusions in dyspepsia, flatulent colic, diarrhœa, the costiveness of old people and of those of cold phlegmatic habits. The dose to operate as a purgative is f℥vj., and from f℥j. to f℥iij. to produce stomachic effects.

TINCTURA SCILLÆ, Lond. Edin. Dub. *Tincture of Squills.*

"Take of squill, fresh dried and sliced, or in coarse powder, *five ounces;* proof spirit, *two pints.* Macerate for seven days (fourteen, *D.*), and filter." (It may be prepared by percolation, *E.*).

Proof spirit takes up the active principles of the squill, and affords a convenient form of exhibiting it in all the cases in which it is indicated. The dose is from ♏x. to ♏xxx., given in almond mixture, ammoniacum mixture, or mucilage, &c.

TINCTURA SENNÆ COMPOSITA[1], Lond. Edin. Dub. *Compound Tincture of Senna.*

"Take of senna leaves, *three ounces and a half;* caraway, bruised, *three drachms and a half;* cardamoms, bruised, *a drachm;* stoned raisins, *five ounces;* proof spirit, *two pints.* Macerate for seven days, and filter."

Edinburgh.

"Take of sugar, *two ounces and a half;* coriander, bruised, *one ounce;* jalap, in moderately fine powder, *six drachms;* senna, *four ounces;* caraway, bruised, and cardamom seeds, bruised, of each, *five drachms;* raisins, bruised, *four ounces;* proof spirit, *two pints.* Digest for seven days; strain the liquor; express strongly the residuum, and filter the liquids. This tincture may be more conveniently and expeditiously prepared by percolation, as directed for the compound tincture of cardamom. If Alexandrian senna be used for this preparation, it must be freed of cynanchum leaves by picking."

Dublin.

"Take of senna, *four ounces;* caraway seeds, bruised, cardamom seeds, bruised, of each, *half an ounce;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

These tinctures are stomachic and purgative. They are very efficacious in flatulent colic, atonic gout[2], and as opening medicine for those whose bowels have been weakened by intemperance. The dose is from f℥ij. to f℥j., in any appropriate vehicle.

TINCTURA SERPENTARIÆ, Lond. Edin. *Tincture of Snake Root.*

"Take of snake root, *three ounces and a half;* proof spirit, *two pints.* Macerate for seven days; express and filter."

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[1] Elixir salutis, P. L. 1720. Tinct. Sennæ, P. L. 1824.

[2] The preparation called *Gout Cordial* is a mixture of tincture of senna and tincture of rhubarb.

Edinburgh.

"Take of serpentaria, in moderately fine powder, *three ounces and a half;* cochineal, bruised, *one drachm;* proof spirit, *two pints.* Proceed by percolation or digestion as for the tincture of cinchona."

This tincture is stimulant, diaphoretic; and a useful addition to infusion of cinchona bark, in typhoid and putrid fevers, gout, and periodic headache. The dose is from f ʒ ss. to ʒ ij.

TINCTURA STRAMMONII, Dub. *Tincture of Strammonium.*

"Take of Strammonium seeds, bruised, *five ounces;* proof spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

This tincture can be prepared also by percolation. It is a convenient form in which to administer the drug. Dose ♏ x. to ♏ xxx.

TINCTURA TOLUTANA, Lond. Edin. Dub. *Tincture of Tolu Balsam.*

"Take of balsam of tolu, *two ounces;* rectified spirit, *two pints.* Macerate the balsam until it be liquefied, and strain."

Edinburgh.

"Take of tolu balsam, in coarse powder, *three ounces and a half;* rectified spirit, *two pints.* Digest the balsam in the spirit with a gentle heat till it is dissolved, and filter."

Dublin.

"Take of balsam of tolu, *two ounces;* rectified spirit, *one pint.* Dissolve the balsam in the spirit with the aid of a gentle heat; let it stand until the sediment subsides, then decant the clear tincture."

Seldom used except for flavour. The London tincture about half the strength of the other two. Dose ♏ x. to f ʒ ss.

TINCTURA VALERIANÆ, Lond. Edin. Dub. *Tincture of Valerian.*

"Take of valerian, bruised, *five ounces;* proof spirit, *two pints.* Macerate for seven days (fourteen days, *Dub.*), and filter. (It may be made by percolation. E.).

Syn. Teinture de Valeriane (*F.*), Baldriantinktur (*G.*), Tintura di Valeriana (*I.*).

Proof spirit extracts the active matter of the valerian, but the tincture cannot be given in doses sufficiently large to prove very efficacious.

TINCTURA VALERIANÆ COMPOSITA, Lond. TINCTURA VALERIANÆ AMMONIATA, Edin. *Compound Tincture of Valerian. Ammoniated Tincture of Valerian.*

"Take of valerian root, bruised, *five ounces;* aromatic spirit of ammonia, *two pints.* Macerate for seven days; express and filter."

Edinburgh.

Take of valerian, bruised, *five ounces;* spirit of ammonia, *two pints.* Proceed by percolation or by digestion in a well-closed vessel, as directed for tincture of cinchona."

Syn. Baldriantinktur mit Ammonium liquor (*G.*).

As the ammonia corresponds in virtue with the valerian, this tincture is more powerful than the foregoing. It is advantageously employed in hysteria and other nervous affections, in doses of f ʒ j. or ʒ ij., given in milk, or some other bland fluid.

TINCTURA ZINGIBERIS, Lond. Edin. Dub. *Tincture of Ginger.*

"Take of ginger root, bruised (in coarse powder, *E.*), *two ounces and a half;* rectified spirits, *two pints.* Macerate for seven days, and filter." Proceed by percolation or digestion, as directed for tincture of cinchona, *E.*

Dublin.

"Take of ginger root, in coarse powder, *eight ounces;* rectified spirit, *two pints.* Macerate for fourteen days; strain, express, and filter."

This tincture possesses all the pungency of the ginger, and is useful as a stimulant and carminative, in atonic gout, when it attacks the stomach, in flatulent colic, and as a corrigent to griping purgatives. Dose, f ʒ ss. to f ʒ jss.

It will be observed that the Dublin tincture is nearly three times the strength of the London and Edinburgh; it must be therefore given in corresponding doses.

TABLE OF TINCTURES.

Tinctures prepared with rectified Spirit of the Spec. Grav. 838.

Tinctura Aconiti,
———— Aloes,
———— Aloes comp.
———— Aloes et Myrrhæ,
———— Ammoniæ comp.
———— Assafœtidæ,
———— Benzoini comp.
———— Camphoræ,
———— Cannabis Indicæ,
———— Castorei,
———— Cubebæ, L.
Tinctura Ferri Acetatis,
———— Ferri Sesquichloridi,
———— Guaiaci,
———— Iodinii,
———— Iodinii comp.
———— Kino,
———— Lavandulæ comp.
———— Lupulinæ,
———— Myrrhæ,
———— Tolutana,
———— Zingiberis.

Tinctures prepared with Proof Spirit of the Spec. Grav. 920.

Tinctura Aurantii,
———— Buchu,
———— Calumbæ,
———— Camphoræ comp.
———— Cantharidis,
———— Capsici,
———— Cardamomi,
———— Cardamomi comp.
———— Cascarillæ,
———— Catechu,
———— Chirettæ,
———— Cinchonæ,
———— Cinchonæ pallidæ,
———— Cinchonæ comp.
———— Cinnamomi,
———— Cinnamomi comp.
———— Cocci Cacti,
———— Colchici,
———— Conii,
———— Croci,
———— Cubebæ, D.
———— Digitalis,
———— Ergotæ,
———— Ferri Ammoniati,
Tinctura Gallæ,
———— Gentianæ comp.
———— Hellebori,
———— Hyosciami,
———— Jalapæ,
———— Kino,
———— Krameriæ,
———— Lactucarii,
———— Limonum,
———— Lobeliæ,
———— Lupuli,
———— Matico,
———— Opii,
———— Quassiæ,
———— Quassiæ composita,
———— Rhei,
———— Rhei composita,
———— Rhei et Aloes,
———— Rhei et Gentianæ,
———— Scillæ,
———— Sennæ comp.
———— Serpentariæ,
———— Strammonii,
———— Valerianæ.

TROCHISCI.

TROCHES, OR LOZENGES.

TROCHES and lozenges are powders mixed up with glutinous substances into little cakes, and afterwards dried. The lozenges of the confectioner are superior in elegance to those of the apothecary; hence the London and Dublin Colleges have properly omitted them.

TROCHISCI ACACIÆ, Edin. *Gum Lozenges.*

"Take of gum arabic, *four ounces;* starch, *one ounce;* pure sugar, *one pound.* Mix and pulverize them, and make them into a proper mass with rose-water for forming lozenges."

This is a very agreeable lozenge, calculated for allaying the tickling in the throat which provokes coughing.

TROCHISCI ACIDI TARTARICI, Edin. *Tartaric Acid Lozenges.*

"Take of tartaric acid, *two drachms;* pure sugar, *eight ounces;* volatile oil of lemons, *ten minims.* Pulverize the sugar and acid; add the oil; mix them thoroughly, and with mucilage beat them into a proper mass for making lozenges."

TROCHISCI CRETÆ, Edin. *Chalk Lozenges.*

"Take of prepared chalk, *four ounces;* gum arabic, *one ounce;* nutmeg, *one drachm;* pure sugar, *six ounces.* Reduce them to powder, and beat them with a little water into a proper mass for making lozenges."

These are used against acidity of the stomach, when accompanied with diarrhœa.

TROCHISCI GLYCYRRHIZÆ, Edin. *Liquorice Lozenges.*

"Take of extract of liquorice, and gum arabic, each, *six ounces;* pure sugar, *one pound.* Dissolve them in a sufficiency of boiling water, and then concentrate the solution over the vapour-bath to a proper consistence for making lozenges."

TROCHISCI LACTUCARII, Edin. *Lactucarium Lozenges.*

"To be prepared with lactucarium in the same proportion and in the same manner as the opium lozenge."

Useful in tickling coughs.

TROCHISCI MAGNESIÆ, Edin. *Magnesia Lozenges.*

"Take of carbonate of magnesia, *six ounces*; pure sugar, *three ounces*; nutmeg, *one scruple.* Pulverize them, and with mucilage of tragacanth beat them into a proper mass for making lozenges."

Troches of magnesia are used for acidity of the stomach.

TROCHISCI MORPHIÆ, Edin. *Morphia Lozenges.*

"Take of muriate of morphia, *one scruple*; tincture of tolu, *half an ounce*; pure sugar, *twenty-five ounces.* Dissolve the muriate of morphia in a little hot water; mix it and the tincture of tolu with the sugar; and with a sufficiency of mucilage form a proper mass for making lozenges; each of which should weigh about fifteen grains."

These lozenges may be used for the same purposes as opium lozenges.

Each lozenge contains about $\frac{1}{40}$th grain of muriate of morphia.

TROCHISCI MORPHIÆ ET IPECACUANHÆ, Edin. *Lozenges of Morphia and Ipecacuan.*

"Take of muriate of morphia, *one scruple*; ipecacuan, in fine powder, *one drachm*; tincture of tolu, *half a fluid ounce*; pure sugar, *twenty-five ounces.* Dissolve the muriate in a little hot water; mix it with the tincture and the ipecacuan and sugar; and with a sufficiency of mucilage beat the whole into a proper mass, which is to be divided into fifteen grain lozenges."

The same use may be made of this lozenge as of the simple morphia lozenge. Each contains about $\frac{1}{40}$th grain of muriate of morphia.

TROCHISCI OPII, Edin. *Opium Lozenges.*

"Take of opium, *two drachms*; tincture of tolu, *half an ounce*; pure sugar, in fine powder, *six ounces*; powder of gum arabic, and extract of liquorice, of each, *five ounces.* Reduce the opium to a fluid extract; mix it intimately with the liquorice, previously reduced to the consistence of treacle; add the tincture; sprinkle the gum and sugar into the mixture, and beat it into a proper mass, which is to be divided into lozenges of ten grains."

Seven and a half of these lozenges contain about one grain of opium. They are useful in tickling coughs depending on irritation of the fauces.

TROCHISCI SODÆ BICARBONATIS, Edin. *Lozenges of Bicarbonate of Soda.*

"Take of bicarbonate of soda, *one ounce*; pure sugar, *three*

ounces; gum arabic, *half an ounce.* Pulverize them, and with mucilage beat them into a proper mass for making lozenges."

These lozenges may be substituted for the chalk lozenge in acidity of the stomach.

VEGETABILIA.

VEGETABLES.

THE collection of vegetables cannot be attended to by the apothecary, and, consequently, the directions necessary for that purpose are of less importance to him than a knowledge of the botanical characters of plants, and the appearances they assume when they are collected under proper circumstances and well dried: for inert plants are often introduced by the collectors among those which possess the most active properties; and from a careless or an improper mode of drying plants, the medicinal virtues of the majority of them are altogether destroyed. When, however, opportunities permit the apothecary to be his own collector, they should not be neglected; and the collection and drying of some plants, particularly of foxglove and hemlock, should never be left to the common collector. The following general directions are therefore given in the London Pharmacopœia for collecting vegetable substances.

"VEGETABLES are to be gathered in dry weather, and when no dew nor rain is upon them: they are to be collected every year, and any which shall have been longer kept are to be thrown away." This is a direction of the utmost importance as far as regards the more active vegetable remedies, such as digitalis; for the skill of the most experienced physician will little avail the patient, if the drug which is ordered have lost its medicinal properties from being too long kept.

"ROOTS and RHIZOMES for the most part, are to be dug up after the old leaves and stalks have fallen, and before the new ones appear." The object of this order is the obtaining the roots with their active principles in the most concentrated state, which may be effected by digging them up late in autumn or early in winter, after the sap is completely detruded to the root, and the stem is withered, but yet attached to the root, by which its situation is pointed out. If any change in the composition of the juices takes place during the cessation of vegetation in winter, it is probable that the same will happen, if the root, after being dug up, be preserved in sand.

"BARKS are to be collected at that season in which they are more easily separated from the wood." Spring is the season here

alluded to; as at this time, after the sap begins to ascend, the bark is in general very easily separated. But a more important reason may be given for preferring this period, as in spring the active principles deposited in the proper cells of the bark are most abundant: thus, oak bark collected in spring contains four times more tannin than that which is collected in winter.[1]

" HERBS and LEAVES are to be gathered after the flowers have expanded, and before the seeds are mature." These should be in the most perfect state, free from disease, and full grown.

" FLOWERS are to be gathered when just opened." There is, however, one exception to this rule, namely, the red rose, which must be gathered before the buds are expanded.

" FRUITS and SEEDS are to be collected when they are ripe."

" The parts of vegetables, unless we have directed otherwise, are to be kept dried for use. Those which are to be dried should be put into very shallow wicker baskets, soon after they are gathered, and exposed to a gentle heat, and to a current of air in a dark place; then, when the moisture is driven off, gradually increase the heat to 150°, that they may be dried. Lastly, preserve the more delicate parts, as the flowers and leaves, in black glass bottles, well closed; keep the other parts in proper vessels, preventing the access of light and moisture."

When plants cannot be dried immediately on being gathered, they should be revived by immersing their stalks in water for twelve hours. When the leaves are the parts intended to be employed, these are then to be carefully freed from the stalks, and laid in thin layers in baskets of willow stripped of its bark, in a drying room kept quite dark. They should then be exposed to a temperature of 140° Fahr. for six or eight hours. When the leaves begin to shrivel, they should be turned, and the same temperature continued until they crumble readily in the hand. When the process has been well conducted, the leaves should retain their green colour and their medicinal properties. The vessels best adapted for preserving them are oil-jars made perfectly clean and dry, closely covered and kept in a dry, warm situation. It is better to preserve those leaves, the virtues of which are particularly connected with their colour, namely hemlock and foxglove, in this state, than in the form of powder, a small portion only being occasionally powdered for current use.[2]

The juices of fresh vegetables obtained by expression contain, besides the sap of which they chiefly consist, mucilage, fecula, extractive matter, and the other proper juices of the plant. When newly expressed, these matters are mixed together, and form a

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[1] Vide Biggin's Table, *Phil. Trans.* 1799.

[2] The above is the method adopted by Mr. Battley, of Fore Street, whose attempts to improve this part of Pharmacy deserve the thanks of the profession.

viscid, heterogeneous fluid, which gradually separates by rest into two parts; the one formed of a deposit of all the insoluble components of the juice generally involved in mucilaginous matter; the other a clear liquor, consisting of water, holding some mucilage in solution, with the acids and salts, if any, and other soluble principles of the juice. As the clear liquor is that which is wished to be obtained for medical use, it is separated by first decanting it from the deposit, then filtering it repeatedly through a linen cloth, and adding about one-fortieth part of its weight of alcohol; after which it is allowed to remain at rest for some time, and again filtered previous to being put into the bottles in which it is intended to be preserved. The bottles should be kept in a cool cellar, and sunk up to the neck in sand.

Various other methods, also, are employed for depurating vegetable juices; but as these preparations are now almost obsolete, we do not think it necessary to detail them. By whatever means they are prepared, vegetable juices undergo chemical changes, and spontaneous decompositions from keeping, which must necessarily affect their virtues as medicines. They are, therefore, properly rejected from all the Pharmacopœias.

VEGETABILIA PRÆPARATA.

PREPARED VEGETABLE SUBSTANCES.

AMMONIACUM PRÆPARATUM, Lond. *Prepared Ammoniacum.*

"Take of ammoniacum, *a pound;* water, *enough to cover it.* Boil the ammoniacum with the water until they are mixed. Strain the mixture through a hair sieve, and, stirring constantly, evaporate in a water-bath to such a degree that, on cooling, it becomes hard."

Officinal preparations. — *Emplastrum Ammoniaci. Emplastrum Ammoniaci cum Hydrargyro. Mistura Ammoniaci.*

ASSAFŒTIDA PREPARATA, Lond. *Prepared Assafœtida.*

"Prepare this in the same manner as has been ordered for prepared ammoniacum."

Officinal preparations.—*Enema Assafœtida.* Also employed in *Pilula Galbani composita.*

By means of this process of preparing these gum resins, any mechanical impurities with which they are combined are removed, at the loss, however, of some of the volatile principles.

CASSIA PRÆPARATA, Lond. *Prepared Cassia.*

"Take of cassia, broken lengthwise, *a pound;* distilled water, *as much as may suffice to cover the cassia.* Macerate for six hours, frequently stirring; strain the softened pulp through a hair sieve, and evaporate in a water-bath to the consistence of a confection."

Officinal preparation.—*Confectio Cassiæ.* It enters also into the composition of *Confectio Sennæ.*

GALBANUM PRÆPARATA, Lond. *Prepared Galbanum.*

"Prepare this in the same manner as has been ordered for prepared ammoniacum."

Officinal preparations.—*Emplastrum Galbani Pilula Galbani composita.*

PIX BURGUNDICA PRÆPARATA, Lond. *Prepared Burgundy Pitch.*

"Prepare this in the same manner as has been ordered for prepared ammoniacum."

Officinal preparation.—*Emplastrum Picis.* It enters also into the composition of *Emplastrum Cumini.*

PRUNUM PRÆPARATUM, Lond. *Prepared Prunes.*

"Take of prunes, *a pound;* water, *sufficient to cover the prunes.* Boil gently for four hours; press the softened pulp first through a fine sieve made of cane, and afterwards through a fine hair sieve. Lastly, evaporate the pulp in a water-bath, to the consistence of a confection."

Used in the formation of *Confectio Sennæ.*

SAGAPENUM PRÆPARATUM, Lond. *Prepared Sagapenum.*

"Prepare this in the same manner as has been ordered for prepared ammoniacum."

It enters into the composition of *Confectio Rutæ, Pilula Galbani composita.*

STYRAX PRÆPARATA, Lond. *Prepared Storax.*

"Take of storax, *a pound;* rectified spirit, *four pints.* Dissolve the storax, and strain through linen; then, by means of a gentle heat, distil the greater part of the spirit; evaporate what is left in a water-bath to a proper consistence."

Officinal preparation.—*Pilula Styracis composita.* It enters into the composition of *Tinctura Benzoini composita.*

Rectified spirit dissolves out all the valuable portion of commercial storax, which is frequently very much adulterated; hence this process of purifying it is essential to render the storax fit for internal administration.

TAMARINDUS PRÆPARATUS, Lond. *Prepared Tamarind.*

"Take of tamarind, *a pound;* water, *as much as may be sufficient to cover the tamarind.* Macerate with a gentle heat for four hours, and complete the process in the same way as has been ordered for prepared prunes."

It forms one of the ingredients of *Confectio Cassiæ* and *Confectio Sennæ.*

THUS PRÆPARATUM, Lond. *Prepared Frankincense.*

"Take of frankincense, *a pound;* water, *as much as may be necessary to cover the frankincense.* Boil the frankincense in the water until it melts, and strain through a hair sieve; then, when cold, the water being poured off, keep the frankincense for use."

It is an ingredient in the following plasters: *Emplastrum Ferri; Emplastrum Galbani; Emplastrum Opii; Emplastrum Picis; Emplastrum Potassii Iodidi.*

VINEGARS.

Præparata e Aceto.

ACIDUM ACETICUM CAMPHORATUM, Edin. Dub. *Camphorated Acetic Acid.*

"Take of camphor, *half an ounce;* acetic acid, *six fluid ounces and a half.* Pulverize the camphor with the aid of a little rectified spirit, and dissolve it in the acid."

Dublin.

"Take of camphor, *one ounce;* rectified spirit, *one fluid drachm;* strong acetic acid, *ten fluid ounces.* Reduce the camphor to powder by trituration with the spirit; then add the acid, and dissolve."

This is an efficient embrocation in rheumatism and other chronic articular pains.

ACETUM CANTHARIDIS, Lond. Edin. Dub. *Vinegar of Cantharides.*

"Take of cantharides, rubbed to powder, *two ounces;* acetic acid, *a pint.* Macerate the cantharides with the acid for eight days, frequently shaking; lastly, press and strain."

Edinburgh.

"Take of cantharides, in powder, *three ounces;* acetic acid, *five*

fluid ounces; pyroligneous acid, *fifteen fluid ounces;* euphorbium, in coarse powder, *half an ounce.* Mix the acids, add the powders, macerate for seven days, strain, and express strongly, and filter the liquors."

Dublin.

"Take of Spanish flies, in fine powder, *four ounces;* strong acetic acid, *four fluid ounces;* acetic acid of commerce, sp. gr. 1044, *sixteen fluid ounces.* Mix the acids, and, having added the flies, macerate in a close vessel for fourteen days; then strain through flannel with expression, and filter so as to obtain a clear liquor."

For raising a sudden blister: but if the acetic acid, applied with a piece of lint, be strong, and its evaporation prevented, by placing a piece of oil-silk over the lint, a blister will be as rapidly raised without the cantharides as with them.[1]

The London formula, if we expect any benefit from the cantharides, is too weak, and, therefore, it often fails to raise a blister. The best proportions are one part of the cantharides to four parts of acetic acid.

ACETUM COLCHICI, Lond. Edin. Dub. *Vinegar of Meadow Saffron.*

"Take of dried meadow-saffron corms, *three drachms and a half;* dilute acetic acid, *one pint;* proof spirit, *one fluid ounce and a half.* Macerate the meadow saffron with the acid in a closed vessel for three days; afterwards press and strain, and set it by, that the dregs may subside; lastly, add the spirit to the clear liquor."

Edinburgh.

"Take of colchicum bulb, fresh and sliced, *one ounce;* distilled vinegar, *sixteen fluid ounces;* proof spirit, *one fluid ounce.* Macerate the colchicum in the vinegar for three days in a covered glass vessel; strain, and express strongly; filter the liquors, and add the spirit."

Dublin.

"Take of colchicum bulbs, dried and bruised, *one ounce;* acetic acid of commerce (sp. gr. 1044), *four fluid ounces;* distilled water, *twelve ounces.* In the acid, diluted with the water, macerate the colchicum in a closed vessel for seven days; then strain with expression, and filter."

When dug up in July, the cormus contains that principle for which it is employed in the greatest perfection, and of which

[1] An Acetic Extract is employed as a vesicant in Germany. It is made by macerating 4 parts of powder of cantharides in 1 part of concentrated pyroligneous acid, and 16 parts of alcohol, digesting at a temperature of 90°, expressing the fluid and distilling off the alcohol at a gentle heat, until the contents of the retort assume an oily consistence. — Soubieran, *L'Experience,* April, 1843.

vinegar is a good solvent. This solution is now introduced as a better form of preserving the virtues of the remedy than the oxymel. It is given as a diuretic in ascites and hydro-thorax; but it is less to be depended on than the squill. It should be prepared with the dried cormus, in which case the proportion should be six drachms to a pint of vinegar. It is employed in gout. The dose is from f ʒss. to f ʒj., united with any bland fluid. The Dublin preparation is three times stronger than the other two, and therefore the dose must be proportionately less.

ACETUM OPII, Edin. Dub. *Vinegar of Opium.*

"Take of opium, *four ounces;* distilled vinegar, *sixteen fluid ounces.* Cut the opium into small fragments; triturate it into a pulp with a little of the vinegar, add the rest of the vinegar, macerate in a closed vessel for seven days, and agitate occasionally; then strain and express strongly, and filter the liquor."

Dublin.

"Take of opium, in coarse powder, *one ounce and a half;* dilute acetic acid, *one pint.* Macerate for seven days in a close vessel with occasional agitation; then strain with expression, and filter."

This preparation of opium contains an acetate of morphia; and resembles closely the celebrated black drop. The dose is from five drops to fifteen of the Edinburgh preparation; the Dublin is only one-third the strength.

ACETUM SCILLÆ, Lond. Edin. Dub. *Vinegar of Squill.*

"Take of fresh dried squill, bruised, *two ounces and a half;* distilled acetic acid, *one pint;* proof spirit, *one fluid ounce and a half.* Macerate the squill in the acid with a gentle heat, in a covered vessel, for three days; then express the liquor, and set it aside that the dregs may subside; lastly, add the spirit to the clear liquor."

Edinburgh.

"Take of dried squill, in small fragments, *five ounces;* distilled vinegar, *two pints;* proof spirit, *three fluid ounces.* Macerate the squill in the vinegar for seven days in a covered glass vessel; strain and express the liquor; add the spirit, and filter the whole."

Dublin.

"Take of squill, dried and bruised, *two ounces;* acetic acid of commerce (sp. gr. 1044), *four fluid ounces;* distilled water, *twelve ounces.* In the acid, diluted with the water, macerate the squill in a close vessel for seven days; then strain with expression, and filter."

Syn. Vinaigre scillitique (*F.*), Meerzwiebelessig (*G.*).

Vinegar extracts and holds in solution the *scillitine*, the principle of the squill, upon which its efficacy as a remedy depends. This preparation has long been used as an expectorant and diuretic in chronic catarrh, humoral asthma, and dropsies. The dose is from f ʒ ss. to f ʒ ij., given in cinnamon or mint water. In large doses it produces vomiting; and is occasionally used as an emetic in the above diseases, when the stomach is loaded.

When kept, the vinegar of squill deposits a precipitate, which consists of citrate of lime and tannate of lime."[1]

It is contained in *Oxymel Scillæ*, L. *Syrupus Scillæ*, E.

VINA.

WINES.

WINE acts upon vegetable substances in nearly the same manner as diluted spirit, dissolving such of their proximate principles as can be taken up by water and alcohol when combined: hence it has been long used as a menstruum for extracting the active parts of medicinal vegetables; and the solutions thus formed have been denominated *Medicated Wines.* As a solvent, however, wine is liable to the objection of inequality of strength; and owing to the spontaneous decomposition which it undergoes from exposure to the air, it is still more objectionable, this change being likely to take place sooner when it is imbued with principles all of which tend to hasten the fermentative process. To remedy these disadvantages in this class of preparations, Parmentier has proposed[2], that instead of preparing medicated wines in the usual method, the alcoholic tinctures well prepared should be added to wine in given quantities: by which means, he contends, that the preparations are less nauseous, and, what is a still greater advantage, are always of a determinate strength. The British Colleges still order medicated wines to be prepared after the old method; and when the vegetable products which are to be taken up are of an alkaline nature, as morphia, veratria, &c., it is still the best method. They should be kept in very well-corked bottles, and in a cool situation.

VINUM ALOES, Lond. Edin. *Wine of Aloes.*

"Take of powdered Socotorine or hepatic aloes, *two ounces;* canella, powdered, *four drachms;* sherry wine, *two pints.* Macerate for seven days, and filter."

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[1] Vogel, *Annales de Chimie*, vol. lxxxiii. p. 157.

[2] *Annales de Chimie,* lii. 46.

Edinburgh.

"Take of Socotorine or East Indian aloes, *an ounce and a half;* cardamom-seeds, ground, and ginger, in coarse powder, of each, *a drachm and a half;* sherry, *two pints.* Digest for seven days, and strain through linen or calico."

Syn. Vin d'Aloe (*F.*), Vino Aloetico (*I.*).

Wine is an excellent solvent of aloes, and, therefore, these preparations contain all the virtues of the remedy in a concentrated state.

Medical properties and uses. — Wine of aloes is an excellent warm purgative and stomachic. It has long been employed with benefit in cold phlegmatic habits, in cases of paralysis, gout, dyspepsia, and chlorosis. The dose is from f ʒ j. to f ʒ ij. to act as a stomachic, and from f ℥ ss. to f ℥ ij. to produce purging.

Aloes are advantageously combined with alkalies; and in this state I have long been in the habit of employing a wine containing aloes and myrrh, in dyspepsia and chlorosis; and, also, in that affection of the mesenteric glands in children which produces a tumid and tense abdomen. The following is the formula I employ, which was copied, with some modification, from a very old pharmacopœia, which accidently fell into my hands; but of the date of which I have unfortunately preserved no memorandum: —

℞ Sodæ carbonatis ℥ iij.
Ammoniæ carbonatis ʒ ivss.
Myrrhæ ʒ vj.
Aloes extracti ʒ vj.
Vini albi (*sherry Anglicè*) f ℥ xxiv.
Macere per dies septem, et cola.

The dose is from one fluid drachm to half a fluid ounce.

VINUM ANTIMONII POTASSIO TARTRATIS. See *Preparations of Antimony.*

VINUM COLCHICI, Lond. Edin. *Wine of Colchicum.*

"Take of the dried corms of meadow saffron, *eight ounces;* sherry wine, *two pints.* Macerate for seven days, and strain."

Edinburgh.

"Take of colchicum bulb, dried and sliced, *eight ounces;* sherry, *two pints.* Digest for seven days, strain, express strongly the residuum, and filter the liquors."

The medicinal power of the cormus of colchicum depends on *colchicia.* It is combined, in the cormus of colchicum, with a large quantity of starch, some mucilage and gluten, gallic acid, and much

water, the proportion of which differs considerably in different cormi, according to the moist or dry nature of the soil in which they have grown, and the season of the year in which they are dug up for use.

When the dried cormus, taken up at a proper season, is employed, the strength of the preparation is likely to be uniform.

The London formula is a modification of the following process, recommended for the preparation of the wine of *colchicum:* — "Take of the bulbs of colchicum (dug up in July or August), sliced transversely and dried without heat, or at a temperature not exceeding 110°, *two ounces and a half;* pulverize them, and pour upon the powder put into a glass bottle *twelve ounces* of good sherry wine. Agitate the mixture twice a day for seven days, and then filter for use."

Medical properties and uses. — Wine of colchicum is a powerful sedative and purgative. It is administered with great advantage in inflammatory and painful nervous affections, as, for example, gout, and acute rheumatism, connected with a disordered condition of the liver: it diminishes the force and frequency of the pulse, allays the pain, and cuts short the paroxysm; but it rarely produces a permanently favourable result without stimulating the duodenum and biliary ducts, and producing a copious discharge of bilious stools. It is apt to nauseate the stomach; a property which is subdued by combining it with magnesia: but in some habits even this does not correct its nauseating qualities, and its use is followed by great faintness and depression of nervous power. The dose of wine of colchicum is from ♏xxx. to f ʒ jss., given in conjunction with magnesia in water or in the infusion of cinchona bark, of gentian root, or any other bitter.

VINUM FERRI. See *Preparations of Iron.*

VINUM GENTIANÆ, Edin. *Wine of Gentian.*

"Take of gentian, in coarse powder, *half an ounce;* yellow bark, in coarse powder, *one ounce;* bitter orange-peel, dried and sliced, *two drachms;* canella, in coarse powder, *one drachm;* proof spirit, *four fluid ounces and a half;* sherry, *one pint and sixteen fluid ounces.* Digest the root and barks for twenty-four hours in the spirit; add the wine; and digest for seven days more; strain, and express the residuum strongly, and filter the liquors."

Syn. Vin de Gentiane composé (*F.*), Vino di Genziana composto (*I.*).

This wine, when well prepared, is stomachic and tonic; but, by keeping, it is very apt to become acescent. The dose is from f ʒ iv. to f ʒ vj., given two or three times a day.

VINUM IPECACUANHÆ, Lond. Edin. Dub. *Wine of Ipecacuanha.*

"Take of ipecacuanha, bruised, *two ounces and a half;* sherry wine, *two pints.* Macerate for seven days, and strain."

Edinburgh.

"Take of ipecacuanha, in moderately fine powder, *two ounces and a half;* sherry, *two pints.* Digest for seven days, and then filter."

Dublin.

"Take of ipecacuanha, in coarse powder, *two ounces and a half;* sherry wine, *two pints.* Macerate for fourteen days, with occasional agitation; then strain with expression, and filter."

Syn. Vin d'Ipecacuanha (*F.*), Vino con Ipecacuana (*I.*).

From my trials, I find that a pint of sherry wine takes up 100 grains of ipecacuanha, which is the larger proportion of the soluble matter contained in an ounce of the root; and as the active part of the root, or emetina, is very soluble in acetic acid, the acescency of the wine is no objection. As an emetic, ipecacuanha wine is equally efficacious with antimonial wine, and at the same time milder in its operation, and is, therefore, better adapted for infants. For this purpose a tea-spoonful, or f ʒ ss., is given for a dose, and repeated every ten minutes till it operate. In smaller doses, from ♏x. to ♏xx., it answers the same purposes as the powder, and is given in coughs, diarrhœa, dysentery, and other complaints in which a determination to the skin is indicated.

VINUM OPII, Lond. Edin. Dub. *Wine of Opium.*[1]

"Take of extract of opium, *two ounces and a half;* cinnamon, bruised, cloves, bruised, of each, *two drachms and a half;* sherry wine, *two pints.* Macerate for seven days, and strain."

Edinburgh.

"Take of opium, *three ounces;* cinnamon, in moderately fine powder, and cloves, bruised, of each, *two drachms and a half;* sherry, *two pints.* Digest for seven days, and then filter."

Dublin.

"Take of opium, in coarse powder, *three ounces;* sherry wine, *two pints.* Macerate for fourteen days, with occasional agitation; then strain with expression, and filter."

Syn. Vin d'Opium aromatique (*F.*), Vino aromo Opiato (*I.*).

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[1] Laudanum liquidum Sydenhami, P. L. 1720.

The aromatics which this preparation contains are supposed to modify the action of the opium, and prevent the disturbance of the brain and nervous system, which the simple tincture is apt to induce in nervous habits, and where the head is much affected. It is intended to supply the place of the liquid laudanum of Sydenham; but that preparation contained double the quantity of opium, and ʒ j. of saffron, which is altogether omitted in the formulæ of the colleges.[1] Mr. Ware introduced the use of this preparation, as a local application in the second stage of ophthalmia; when the inflammatory symptoms have subsided, and the vessels of the conjunctiva remain turgid with blood. Two or three drops are poured into the eye every morning, until the redness be removed.

The strength of these preparations differs: the London is the strongest, as the extract is used; next the Edinburgh, as troy-weights are employed; whereas the Dublin College order avoidupois weights. Dose ♏ x. upwards.

VINUM RHEI, Edin. Dub. *Wine of Rhubarb.*

"Take of rhubarb, in coarse powder, *five ounces;* canella, in coarse powder, *two drachms;* proof spirit, *five fluid ounces;* sherry, *one pint and fifteen fluid ounces.* Digest for seven days; strain, express strongly the residuum, and filter the liquors."

Dublin.

"Take of rhubarb, in coarse powder, *three ounces;* canella, in coarse powder, *two drachms;* sherry wine, *two pints.* Macerate for fourteen days, with occasional agitation; then strain with expression, and filter."

This wine, when newly prepared, has the same properties, and may be applied to the same uses as the tincture, but it is liable to undergo decomposition. The dose is from f℥ ss. to f℥ j. or more. The Edinburgh is much the stronger of the two.

VINUM TABACI, Edin. *Wine of Tobacco.*

"Take of tobacco, *three ounces and a half;* sherry, *two pints.* Digest for seven days; strain, express strongly the residuum, and filter the liquors."

This is the only form in which tobacco can be conveniently exhibited as an internal remedy. It is given to produce diuretic and antispasmodic effect in dropsies, colica pictonum, and ileus. The dose is from ♏ x. to ♏ xxx., in any proper vehicle.

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[1] The following is Sydenham's formula: — ℞ Vini Hispanici lb j. Opii ℥ ij. Croci ʒ j. pulv. Cinnamomi et Caryophyllarum ā. ā. ʒ j. Infundantur simul in B. M. per duas vel tres dies, donec liquor debitam consistentiam acquirat. Colitura servetur pro usu. *Sydenhami Opera Omnia*, Lond. 1705, p. 147.

VINUM VERATRI, Lond. *Wine of White Hellebore.*

"Take of white hellebore, sliced, *eight ounces;* sherry wine, *two pints.* Macerate for seven days, and strain."

A solution of white hellebore in wine contains *veratria*, the active principle of the root, in which it is combined with an acid. I have no doubt that a vinous preparation of white hellebore, exhibited with due caution, would answer every purpose of the *wine of colchicum.* Wine of white hellebore is seldom employed.

The dose is ten minims, gradually increased to thirty.

UNGUENTA.

OINTMENTS.

THESE are unctuous substances, of nearly the same nature as cerates, but having a consistence much less firm, scarcely exceeding that of butter.

ADEPS SUILLUS PRÆPARATUS, Dub. *Prepared Hog's Lard.*

"Take of lard of commerce, *any convenient quantity.* Melt it in twice its weight of boiling water; stir the mixture constantly; then set the mixture aside to cool, and separate the lard when it has solidified."

This process is for the purpose of removing any salt.

UNGUENTUM ANTIMONII POTASSIO-TARTRATIS, Lond. *Ointment of Potassio-tartrate of Antimony.*

"Take of potassio-tartrate of antimony, rubbed to a very fine powder, *one ounce;* lard *four ounces.* Rub them together."

UNGUENTUM ANTIMONIALE, Edin. *Antimonial Ointment.*

"Take of axunge, *four ounces;* tartar emetic in very fine powder, *one ounce.* Triturate them carefully together into a smooth and uniform mass."

UNGUENTUM ANTIMONII TARTARIZATI, Dub. *Ointment of Tartar Emetic.*

"Take of tartar emetic, in very fine powder, *one drachm;* oint-

ment of white wax, *seven drachms.* Triturate the powder with the ointment in a mortar, until they are intimately mixed."

These ointments are excellent counter-irritants, bringing out a crop of pustules when it is rubbed on the skin. The part should be rubbed with a coarse towel, so as to be reddened, before the ointment is applied.

UNGUENTUM ÆRUGINIS, Edin. *Ointment of Verdigris.*

"Take of resinous ointment, *fifteen ounces;* verdigris, in fine powder, *one ounce.* Melt the ointment, sprinkle into it the powder of verdigris, and stir briskly as it cools and concretes."

UNGUENTUM CUPRI SUBACETATIS, Dub. *Ointment of Subacetate of Copper.*

"Take of prepared subacetate of copper, *half a drachm;* ointment of white wax, *seven drachms and a half.* Triturate the subacetate of copper with the ointment until they are intimately mixed."

Syn. Unguento Egiziaco (*I.*).

These ointments are escharotic and detergent. They are used as an occasional dressing to foul, flabby ulcers; and as an application to scrofulous ulcerations of the tarsi. They can scarcely be used in the undiluted state, unless to act as a caustic for taking down fungous flesh.

UNGUENTUM BELLADONNÆ, Lond. *Ointment of Deadly Nightshade.*

"Take of extract of belladonna, *a drachm;* lard, *an ounce.* Rub together."

A useful preparation for external use; a local anodyne.

UNGUENTUM CANTHARIDIS, Lond. Edin. Dub. *Blistering Ointment.*

"Take of cantharides, reduced into very fine powder, *three ounces;* distilled water, *twelve fluid ounces;* cerate of resin, *a pound.* Boil the water with the cantharides down to one half, and strain. Mix the cerate with the strained liquor, and afterwards let it evaporate to a proper consistence."

Edinburgh.

"Take of resinous ointment, *seven ounces;* cantharides, in very fine powder, *one ounce.* Melt the ointment, sprinkle into it the cantharides powder, and stir the mixture briskly as it concretes on cooling."

Dublin.

"Take of liniment of Spanish flies, *eight fluid ounces;* white wax, *three ounces;* spermaceti, *one ounce.* Melt the wax and spermaceti in the oil, with a gentle heat, and stir the mixture constantly until it concretes."

Syn. Kantharidensalbe (*G.*).

UNGUENTUM INFUSI CANTHARIDIS, Edin. *Ointment of Infusion of Blistering Flies.*

"Take of cantharides, in moderately fine powder, resin, and bees' wax, of each, *one ounce;* Venice turpentine and axunge, of each, *two ounces;* boiling water, *five fluid ounces.* Infuse the cantharides in the water for one night, squeeze strongly, and filter the expressed liquor. Add the axunge, and boil until the water is dispersed; then add the wax and resin; and when these have become liquid remove the vessel from the fire, add the turpentine, and mix the whole thoroughly."[1]

These ointments are intended for promoting a purulent discharge from blistered surfaces.

In the first Edinburgh preparation the cantharides is in fine powder, and this is apt to induce much irritation. Much of the acrimony of the flies in the London and second Edinburgh preparations is dissipated by the boiling. In the Dublin ointment, oil is used to extract the active principle.

UNGUENTUM CERÆ ALBÆ, Dub. *Ointment of White Wax.*

"Take of white wax, *one pound;* prepared lard, *four pounds.* Melt them together with a gentle heat, and stir constantly until the mixture concretes."

This is a useful dressing to benign ulcers and excoriations, and form the basis of the majority of the compound ointments of the Dublin Pharmacopœia.

UNGUENTUM CETACEI[2], Lond. Dub. *Spermaceti Ointment.*

"Take of spermaceti, *five ounces;* white wax, *fourteen drachms;* olive oil, *a pint,* or *as much as may be necessary.* Melt them together over a slow fire, and stir them constantly until they be cold."

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[1] Galen employed an ointment made by macerating the entire insect in melted lard for twenty-four hours, and then straining by expression. Boerhaave proposed to boil the flies in water, then to pour off the liquid, and make an ointment of the boiled insects with the addition of lard.

[2] Unguentum spermaceti, P. L. 1787.

Dublin.

"Take of white wax, *half a pound;* spermaceti, *a pound;* prepared lard, *three pounds.* Melt them together with a gentle heat, and stir constantly until cold."

These ointments form the ordinary dressings for healing blistering surfaces and excoriations.

UNGUENTUM COCCULI, Edin. *Ointment of Cocculus.*

"Take *any convenient quantity* of Cocculus Indicus, separate and preserve the kernels, beat them well in a mortar, first alone and then with a little axunge; and then add axunge till it amounts to five times the weight of the kernels."

For destroying pediculi, and for porrigo.

UNGUENTUM CONII, Lond. *Ointment of Hemlock.*

"Take of fresh hemlock leaves, lard, each, *a pound.* Boil the hemlock in the lard until it becomes crisp, then press through linen."

An application to painful ulcers; a local anodyne.

UNGUENTUM CREASOTI, Lond. Edin. Dub. *Ointment of Creasote.*

"Take of creasote, *half a fluid drachm;* lard, *an ounce.* Rub together."

Edinburgh.

"Take of axunge, *three ounces;* creasote, *one drachm.* Melt the axunge, add the creasote, stir them briskly, and continue to do so as the mixture concretes on cooling."

Dublin.

"Take of creasote, *one fluid drachm;* ointment of white wax, *seven drachms.* To the ointment, liquefied by a moderate heat, add the creasote, and stir constantly until the mixture concrete."

A useful stimulant ointment in porrigo *scutulata.* It has also been used with advantage in *tic douloureux.* It should be rubbed upon the part three times a day.

UNGUENTUM CUPRI SUBACETATIS, Dub. *Ointment of Subacetate of Copper.* (See *Unguentum Æruginis.*)

UNGUENTUM ELEMI[1], Lond. Dub. *Ointment of Elemi.*

"Take of elemi, *three ounces;* turpentine, *two ounces and a half;* suet, *six ounces;* olive oil, *half a fluid ounce.* Melt the

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[1] Unguentum e gummi elemi, P. L. 1745. Unguentum elemi comp., P. L. 1824.

elemi with the suet; then remove them from the fire, and mix immediately with the turpentine and oil; afterwards press through a linen cloth."

Dublin.

"Take of resin of elemi, *four ounces;* ointment of white wax, *one pound.* Melt them together, strain through flannel, and stir the mixture constantly until it concretes."

Syn. Onguent d'Elemi et de Térébenthine (*F.*), Elemisalbe (*G.*), Unguento di Elemi e Trementina (*I.*).

This ointment is slightly stimulant. It is used to keep open issues and setons; and as a dressing to ulcers which do not admit of the application of the adhesive straps.

UNGUENTUM GALLÆ COMPOSITUM, Lond. *Compound Ointment of Gall.*

"Take of gall nut, in fine powder, *six drachms;* lard, *six ounces;* powdered opium, *a drachm and a half.* Rub together."

UNGUENTUM GALLÆ, Dub. *Ointment of Gall.*

"Take of galls, in very fine powder, *one drachm;* ointment of white wax, *seven drachms.* Rub the powdered galls with the ointment until a uniform mixture is obtained."

UNGUENTUM GALLÆ ET OPII, Edin. *Ointment of Galls and Opium.*

"Take of galls, in fine powder, *two drachms;* opium, in powder, *one drachm;* axunge, *one ounce.* Triturate them together into a uniform mass."

A useful astringent in piles. The London and Edinburgh ointments are also anodyne, the latter by far the most so, from the amount of opium contained in it; it is also the most astringent of the three.

UNGUENTUM HYDRARGYRI, Lond. Edin. Dub. *Mercurial Ointment.*

"Take of mercury, *a pound;* lard, *eleven ounces and a half;* suet, *half an ounce.* Rub the mercury with the suet, and a little of the lard, until globules are no longer visible; then add the remaining lard, and triturate all together."

Edinburgh.

"Take of purified mercury, *two pounds;* axunge, *twenty-three ounces;* suet, *an ounce.* First rub the mercury with the suet, and

a little of the lard, until the globules disappear; then add the remainder of the fat, and mix the whole thoroughly. This ointment is not well prepared so long as metallic globules may be seen in it with a magnifier of four powers. This ointment may be diluted with twice or thrice its weight of axunge."

Dublin.

"Take of pure mercury, prepared lard, of each, *one pound.* Rub them together until metallic globules cease to be visible to the naked eye."

Syn. Onguent Mercuriale (*F.*), Quecksilbersalbe (*G.*), Unguento Mercuriale (*I.*).

One drachm of this ointment contains thirty grains of mercury.

The preparation of the mercurial ointment requires much labour, care, and patience. During the trituration the mercury is mechanically divided into minute globules, which are prevented from running together again by the viscosity of the fatty matters. They are by some supposed to be gradually oxidized, during the trituration, by the atmosphere; the lard, the extension, and the constant renewal of the surface exposed, favouring very much this effect. The fact of the oxidizement of the metal in this process, however, has been often questioned; and some experiments of M. Roux have thrown much light on the subject. That chemist triturated mercury and maltha, a species of pitch, in a vacuum, and produced the extinction of the metal as well as if the operation had been performed in the air: hence he concludes that the metal is not oxidized, but merely mechanically divided in the ointment. There are still, however, some difficulties in deciding this point. Whatever tends to favour oxidation, as for instance a slight degree of rancidity of the lard, or the oil of eggs, or a portion of old mercurial ointment, shortens the time, and lessens the labour, required for the preparation of the ointment.[1] It is not uncommon, however, to use other means, which are not admissible, to facilitate the process, such as the use of sulphur or turpentine. The first may be detected by the very black colour of the ointment, which is produced by the sulphuret of mercury; and also by the sulphurous odour exhaled, when a paper covered with a little of it is held over the flame of a candle; and the turpentine is detected by its odour also, when the ointment containing it is treated in the same manner. When newly prepared, mercurial ointment has a light grey or bluish colour; this has been ascribed to its containing some unoxidized metal, which separates in globules when it is liquefied

[1] It has lately been proposed to employ the following process: — Take London mould candle, freed from the wick, ℨj.; rub it to the consistence of cold cream, then add ℨiv. of mercury, and continue the friction. The mercury will be killed in ten minutes, after which the lard may be added. — *The Chemist,* vol. i. p. 385.

by a gentle heat; when kept for some time the colour is much deepened, and less metallic mercury subsides, owing to the more complete oxidizement of the metal. As it is of great consequence to procure so important a preparation always of the same degree of strength, and as this can never be accomplished by the present method of preparing the ointment, Mr. Donovan has proposed to prepare it by using black oxide of mercury, at the temperature of 350° Fahrenheit, continuing the friction for two hours. By this method of proceeding, Mr. Donovan found that every ounce of lard dissolves and combines with twenty-one grains of oxide; that the ointment thus prepared can be introduced into the habit in one-third of the time required by the common ointment; and that it is equally efficient with the officinal preparation: but this ointment is not much used.

Medical properties and uses. — The strong mercurial ointment rubbed upon the skin introduces a large quantity of mercury into the system. About ʒj. is rubbed upon the inside of the thighs, or any other part of the body where the cuticle is thin, every night and morning, until the system is affected. The ointment is absorbed during the friction, and carried into the habit, where it produces the same effects as those which result from taking mercurials by the mouth, without the unpleasant affection of the bowels that very commonly follows the introduction of preparations of mercury into the stomach. In order, however, to produce the full effect of the friction, it must be continued until every particle of the ointment disappears; and the operation should be performed by the patient himself. The mercurial ointment is used in this form as an antisyphilitic, as a deobstruent in hepatic affections, and to excite the absorbents in hydrocephalus. A weaker ointment, made by diluting the above with twice or three times its weight of lard, is used only as a topical dressing in venereal sores. During a course of mercurials the patient should be kept in a moderately warm and dry, but airy chamber; and his diet should be chiefly weak broths, milk, and gruel. This ointment is stated to cause an ectrotic effect, when applied to the surface in small-pox. It is said to act as an antiphlogistic, suppressing local inflammation, and preventing the formation of pustules.[1]

UNGUENTUM HYDRARGYRI NITRATIS, Lond.
Ointment of Nitrate of Mercury.

"Take of mercury, *two ounces;* nitric acid, *four fluid ounces;* lard, *a pound;* olive oil, *eight fluid ounces.* Dissolve the mercury in the acid; then mix the liquor, still hot, with the lard and oil melted together."

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[1] *Lancet,* 28th Jan. 1843.

UNGUENTUM CITRINUM, Edin. *Citrine Ointment.*

"Take of pure nitric acid, *eight fluid ounces and six fluid drachms;* mercury, *four ounces;* axunge, *fifteen ounces;* olive oil, *thirty-two fluid ounces.* Dissolve the mercury in the acid with the aid of a gentle heat. Melt the axunge in the oil, with the aid of a moderate heat, in a vessel capable of holding six times the quantity, and while the mixture is hot, add the solution of mercury, also hot, and mix them thoroughly. If the mixture do not froth up, increase the heat a little till this takes place. Keep this ointment in earthenware vessels, or in glass vessels secluded from the light."

UNGUENTUM HYDRARGYRI NITRATIS; vel, UNGUENTUM CITRINUM, Dub. *Ointment of Nitrate of Mercury.*

"Take of pure mercury, *one ounce;* pure nitric acid, *one fluid ounce;* distilled water, *half an ounce;* prepared lard, *four ounces;* olive oil, *eight fluid ounces.* Mix the acid with the water, and dissolve the mercury in the mixture, with the aid of a gentle heat. Melt the lard with the oil, and, while the mixture is hot, add to it the solution of mercury, also hot; let the temperature of the mixture next be raised so as to cause effervescence, and then, withdrawing the heat, stir the mixture with a porcelain spoon, until it concretes on cooling."

UNGUENTUM HYDRARGYRI NITRATIS MITIUS, Lond. *Milder Ointment of Nitrate of Mercury.*

"Take of ointment of nitrate of mercury, *an ounce;* lard, *seven ounces.* Rub them together. This ointment is to be used recently prepared."

Syn. Onguent citrin (*F.*), Gelbe Quecksilbersalbe (*G.*), Unguento Citrino (*I.*).

When properly prepared, this ointment has a beautiful golden colour, and is of the consistence of butter, which it retains if preserved in close pots; but when made with a larger proportion of lard, it becomes hard, brittle, and of a pale, dirty yellow hue, marbled with green blotches. The hardness of this ointment is due to the production of another fat (elaidine) by the action of the nitric oxide upon the oleine contained in the lard and olive oil.

Medical properties and uses. — This ointment is stimulant and detergent. When moderately diluted with lard it is a local remedy of great efficacy in herpes, psoriasis, porrigo, and other cutaneous eruptions. The weaker ointment may almost be regarded as a specific in psorophthalmia, in the purulent ophthalmia of infants producing ectropium, and in ulcerations of the tarsi. When diluted with zinc ointment it prevents the adhesion of the eyelids in purulent ophthalmia. It is applied by taking a little on the finger, liquefying it by the fire or the flame of a candle, and applying it along the inner part of the eyelids.

UNGUENTUM HYDRARGYRI NITRICO-OXYDI, Lond. *Ointment of Nitric Oxide of Mercury.*

"Take of nitric oxide of mercury, *an ounce;* white wax, *two ounces;* lard, *six ounces.* Melt together the wax and lard, then add the nitric oxide of mercury in very fine powder, and rub them together."

UNGUENTUM OXIDI HYDRARGYRI, Edin. *Ointment of Oxide of Mercury.*

"Take of red oxide of mercury, *one ounce;* axunge, *eight ounces.* Triturate them into a uniform mass."

UNGUENTUM HYDRARGYRI OXIDI RUBRI, Dub. *Ointment of Red Oxide of Mercury.*

"Take of red oxide of mercury, *one drachm;* ointment of white wax, *seven drachms.* Reduce the oxide to a very fine powder, and mix it intimately with the ointment by trituration."

Syn. Rothe Quecksilbersalbe (*G.*).

These are excellent stimulant ointments, well adapted for giving energy to indolent foul ulcers. They are also of great use in inflammation of the conjunctiva, with a thickening of the inner membrane of the palpebræ; and to specks of the cornea. They are to be applied in the same manner as the ointment of nitrate of mercury.

UNGUENTUM HYDRARGYRI AMMONIO-CHLORIDI [1], Lond. *Ointment of Ammonio-chloride of Mercury.*

"Take of ammonio-chloride of mercury, *two drachms;* lard, *three ounces.* Add the ammonio-chloride to the lard, and rub them well together."

UNGUENTUM PRÆCIPITATI ALBI, Edin. *Ointment of White Precipitate.*

"Take of white precipitate, *two drachms;* axunge, *three ounces.* Melt the axunge, add the white precipitate, and stir the mixture briskly while it concretes on cooling."

These ointments are stimulant and detergent. They are recommended by Werlhoff, and some other German authors, as a remedy for the itch. They may be safely used on infants.

UNGUENTUM HYDRARGYRI IODIDI, Lond. *Ointment of Iodide of Mercury.*

"Take of iodide of mercury, *one ounce;* white wax, *two ounces;*

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[1] Unguentum e mercurio præcipitato albo, P. L. 1745. Ung. calcis hydrargyri albi, P. L. 1787. Ung. hydrargyri præcipitati albi, P. L. 1824.

lard, *six ounces.* To the wax and lard liquefied together, add the iodide, and rub well together."

This ointment is a useful excitant to scrofulous tumours. The Iodide of the London College is a proto-salt.

UNGUENTUM HYDRARGYRI IODIDI RUBRI. *Ointment of Red Iodide of Mercury.*

"Take of red iodide of mercury, *one drachm ;* ointment of white wax, *seven drachms.* Incorporate the iodide of mercury and ointment by careful trituration in a mortar."

Use as the above, but much more stimulant.

UNGUENTUM IODINII COMPOSITUM, Lond. Dub. *Compound Ointment of Iodine.*

"Take of iodine, *half a drachm ;* iodide of potassium, *a drachm ;* rectified spirit, *a fluid drachm ;* lard, *two ounces.* Add the iodide, reduced into the finest powder, to the lard; then the iodine, dissolved in the spirit; mix all together."

Dublin.

"Take of pure iodine, *half a drachm;* iodide of potassium, *one drachm;* ointment of white wax, *fourteen drachms and a half.* Rub the iodine and iodide of potassium well together in a glass or porcelain mortar; add the ointment gradually, and continue the trituration until a uniform ointment is obtained."

UNGUENTUM IODINEI, Edin. *Ointment of Iodine.*

"Take of iodine, *one drachm;* iodide of potassium, *two drachms;* axunge, *four ounces.* Triturate the iodine and iodide together, and then add gradually the axunge, continuing the trituration till a uniform ointment be obtained."

These are useful topical applications in bronchocele, and swelled glands. It is rendered more efficacious by combining it with an equal weight of mercurial ointment in cases of enlarged liver and spleen.

UNGUENTUM OPII, Lond. *Ointment of Opium.*

"Take of opium, *a scruple;* lard, *an ounce.* Rub them together."

Used as a simple anodyne ointment.

UNGUENTUM PICIS LIQUIDÆ[1], Lond. Edin. Dub. *Tar Ointment.*

"Take of liquid pitch, suet, of each, *a pound.* Melt them together, and press through a linen cloth."

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[1] Unguentum e pice, P. L. 1745. Unguentum picis, P. L. 1787.

Edinburgh.

"Take of tar, *five ounces;* bees'-wax, *two ounces.* Melt the wax with a gentle heat; add the tar, and stir the mixture briskly, while it concretes on cooling."

Dublin.

"Take of tar, *half a pint;* yellow wax, *four ounces.* Melt the wax with a gentle heat; then add the tar, and stir the mixture constantly, until it concretes."

Tar ointment is used with advantage as a detergent in scabby, foul eruptions, lepra, and tinea capitis.

UNGUENTUM PICIS, Lond. *Ointment of Pitch.*

"Take of pitch, wax, resin, each, *eleven ounces;* olive oil, *a pint.* Melt together, and strain through a linen cloth."

This ointment is stimulant, used as the above.

UNGUENTUM PLUMBI COMPOSITUM, Lond. *Compound Ointment of Lead.*

"Take of plaster of lead, *three pounds;* olive oil, *eighteen fluid ounces;* prepared chalk, *six ounces;* dilute acetic acid, *six fluid ounces.* Dissolve the plaster in the oil over a slow fire; then add, first the chalk, and afterwards the acid, constantly stirring, until they have cooled."

A dressing in indolent ulcers, but its utility is doubtful.

UNGUENTUM PLUMBI CARBONATIS, Edin. Dub. *Ointment of Carbonate of Lead.*

"Take of simple ointment, *five ounces;* carbonate of lead, *one ounce.* Mix them thoroughly."

Dublin.

"Take of ointment of white wax, *a pound;* carbonate of lead, reduced to fine powder, *three ounces.* Melt the ointment with a gentle heat; then add the carbonate of lead gradually, and stir the mixture constantly, until it concretes."

Syn. Onguent blanc (*F.*), Bleiweissalbe (*G.*), Unguento bianco (*I.*).

These are useful, cooling, desiccative ointments.

UNGUENTUM PLUMBI ACETATIS, Edin. Dub. *Ointment of Acetate of Lead.*

"Take of simple ointment, *twenty ounces;* acetate of lead, in fine powder, *one ounce.* Mix them thoroughly."

Dublin.

"Take of acetate of lead, in very fine powder, *one ounce;* ointment of white wax, *one pound.* Melt the ointment with a gentle heat; then add the acetate of lead gradually, and stir the mixture constantly until it concretes."

Useful desiccative ointment.

UNGUENTUM PLUMBI IODIDI, Lond. Dub. *Ointment of Iodide of Lead.*

"Take of iodide of lead, *an ounce;* lard, *eight ounces.* Rub them together."

Dublin.

"Take of iodide of lead, in fine powder, *one drachm;* ointment of white wax, *seven drachms.* Mix the iodide of lead intimately with the ointment by trituration."

An excellent ointment in swelled glands and scrofulous tumours.

UNGUENTUM POTASSI IODIDI, Lond. Dub. *Ointment of Iodide of Potassium.*

"Take of iodide of potassium, *two drachms;* boiling distilled water, *two fluid drachms;* lard, *two ounces.* Dissolve the iodide in the water; then mix with the lard."

Dublin.

"Take of iodide of potassium, *one drachm;* distilled water, *half a drachm;* ointment of white wax, *seven drachms.* Triturate the iodide of potassium with the water; then add the ointment, and rub them well together."

A useful form to apply the iodide externally; less irritant than the iodine ointment.

UNGUENTUM RESINÆ, Dub. *Ointment of Resin.*

"Take of resin, in coarse powder, *half a pound;* yellow wax, *four ounces;* prepared lard, *one pound.* Melt them together with a gentle heat; strain the mixture, while hot, through flannel, and stir constantly until it concretes."

UNGUENTUM RESINOSUM, Edin. *Resinous Ointment.*

"Take of resin, *five ounces;* axunge, *eight ounces;* bees' wax, *two ounces.* Melt them together with a gentle heat, and then stir the mixture briskly while it cools and concretes."

These are useful stimulant ointments.

UNGUENTUM SABINÆ, Lond. Dub. *Savine Ointment.*

"Take of fresh savine, bruised, *half a pound;* white wax, *three ounces;* lard, *a pound.* With the lard and wax, melted together, mix the savine; then press through a linen cloth."

Dublin.

"Take of savine tops, dried, and in fine powder, *one drachm;* ointment of white wax, *seven drachms.* Mix the powder intimately with the ointment by trituration."

This is a useful ointment when fresh prepared, to keep up suppuration from a blistered surface, but it does not keep well.

UNGUENTUM SAMBUCI[1], Lond. *Ointment of Elder.*

"Take of elder flowers, lard, of each, *a pound.* Boil the elder flowers in the lard until they become crisp; then press through a linen cloth."

This ointment is simply emollient, and possesses no advantages over simple ointment. It might well be omitted.

UNGUENTUM SIMPLEX, Edin. *Simple Ointment.*

"Take of olive oil, *five fluid ounces and a half;* white wax, *two ounces.* Melt the wax in the oil; and stir the mixture briskly while it concretes on cooling."

A useful emollient ointment for softening the skin.

UNGUENTUM SULPHURIS, Lond. Edin. Dub. *Sulphur Ointment.*

"Take of sulphur, *half a pound;* lard, *a pound.* Rub them together."

Edinburgh.

"Take of axunge, *four ounces;* sublimed sulphur, *one ounce.* Mix them thoroughly together."

Dublin.

"Take of sublimed sulphur, *a pound;* prepared hog's lard, *four pounds.* Mix them well by trituration."

Syn. Onguent soufré (*F.*), Schemfelsalbe (*G.*), Unguento solforato (*I.*).

These ointments are specific in itch. They should be rubbed on the body every night until the disease be cured, but not more than one-fourth part of the body should be covered with it at a time.[2] The London ointment contains twice as much sulphur as the other two.

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[1] Unguentum sambucinum, P. L. 1720.

[2] As the smell of the sulphur ointment is objected to by many people, the following combination has been recommended:—

"Take of carbonate of potassa, *half an ounce;* rose water, *one ounce;* red sulphuret of mercury, *one drachm;* essential oil of bergamot, *half a fluid drachm;* sublimed sulphur, hog's lard, of each, *eleven ounces.* Mix them." — *Bateman on Cutaneous Diseases*, p. 200. note.

UNGUENTUM SULPHURIS COMPOSITUM, Lond. *Compound Ointment of Sulphur.*

"Take of sulphur *four ounces;* white hellebore root, in powder, *ten drachms;* nitrate of potassa, powdered, *two scruples;* soft soap, *four ounces;* lard, *a pound.* Rub them together."

Syn. Onguent soufré composé (*F.*) Unguento solforato composto (*I.*).

This ointment is employed in the same cases as the simple ointment. It is supposed to derive more efficacy from the addition of the white hellebore, but it often excites too much irritation.

UNGUENTUM SULPHURIS IODIDI, Lond. *Ointment of Iodide of Sulphur.*

"Take of iodide of sulphur, powdered, *half a drachm;* lard, *an ounce.* Rub them together."

Used in chronic skin affections as a stimulant and alterative.

UNGUENTUM ZINCI, Lond. Edin. Dub. *Zinc Ointment.*

"Take of oxide of zinc, *an ounce;* lard, *six ounces.* Mix them together."

Edinburgh.

"Take of simple liniment, *six ounces;* oxide of zinc, *one ounce.* Mix them thoroughly together."

Dublin.

"Take of oxide of zinc, *two ounces;* ointment of white wax, *twelve ounces.* Melt the ointment with a gentle heat; and, having added the oxide of zinc, mix them intimately, and stir constantly, until the mixture concretes."

Syn. Onguent de Zinc (*F.*), Zinksalbe (*G.*), Unguento di Zinco (*I.*).

These ointments are moderately astringent and stimulant. They are generally applied in chronic inflammation of the eye, depending on a relaxed state of the vessels; we find them also of very considerable use in sore nipples; and for removing ring-worm, particularly when it attacks the scalp.

APPENDIX TO THE PHARMACOPŒIAS,

INCLUDING THE SUBSTANCES AND PREPARATIONS IN THE APPENDIX TO THE LONDON PHARMACOPŒIA, AND IN THE LIST OF TESTS OF THE EDINBURGH.

MOST of the substances and preparations contained in these lists of tests have already been described in Parts II. and III. Their application as tests for ascertaining the purity of pharmaceutical preparations will now be described.

ACIDUM HYDROSULPHURICUM, Lond. *Hydrosulphuric Acid* or *Sulphuretted Hydrogen.*

This body may be employed either in the form of gas, or dissolved in water. In solution, however, it is liable to decompose with precipitation of the sulphur, and hence the London College orders that it should be *recently prepared.*

Sulphuretted hydrogen precipitates nearly all the common metals, and is frequently ordered to be used to ascertain if metallic impurity is present in any solutions. In acid solutions of certain metals precipitates are formed having the following character: —

In solutions of	Colour of Precipitate.
Antimony	Orange-red.
Arsenic	Bright yellow. *Orpiment.*
Bismuth	Brownish black.
Cadmium	Orange yellow.
Copper	Black.
Lead	Black.
Mercury	Black.
Silver	Black.
Tin { proto-salts	Black.
Tin { per-salts	Yellow.

In slightly alkaline solutions of —

Iron { proto-salts	Black.
Iron { per-salts	Black.

In the London Pharmacopœia this acid is used in testing *Acetum, Acidum aceticum, Acidum arseniosum, Acidum hydrocyanicum dilutum, Acidum sulphuricum, Ammoniæ liquor, Aqua distillata,* and many other preparations.

For mode of preparation and other properties of this acid, see *Acidum Hydrosulphuricum,* Part II.

AMMONIÆ OXALAS, Lond. Edin. (Crystalli, *L.*) *Oxalate of Ammonia* (*in crystals*).

Formula of crystals $N\,H_4\,O, C_2\,O_3 + H\,O$. A solution of this salt is employed for the purpose of detecting the presence of minute quantities of lime, of which it forms a very characteristic test. The precipitate is insoluble in acetic or any vegetable acid, nor is it readily dissolved by *very* dilute hydrochloric acid. It is one of the tests employed in the London and Edinburgh Pharmacopœias to estimate the purity of *distilled water.* When the precipitation of the oxalate of lime occurs in very dilute solutions, the salt is thrown down in octahedral crystals.

For preparation of the salt, see *Preparations of Ammonia,* Part III.

ARGENTUM, Lond. *Silver.*

This metal is employed by the London College to detect the presence of nitric acid in *acetic* or *phosphoric* acids. Pure acetic acid has no power of dissolving silver; but if nitric acid is present in the acetic, some of the metal is dissolved, and consequently hydrochloric acid then produces a precipitate when added to the acid in which the plate of silver has been digested.

ARGENTUM NITRAS (Crystalli), Lond. *Nitrate of Silver* (*in crystals*).

Used in the formation of the solutions.

LIQUOR ARGENTI NITRATIS (recens præparatus), Lond. *Recently prepared Solution of Nitrate of Silver.*

SOLUTIO ARGENTI NITRATIS, Edin. *Solution of Nitrate of Silver.*

SOLUTIO ARGENTI AMMONIATI, Edin. *Ammoniated Solution of Silver.*

For the preparation of these three solutions, see *Preparations of Silver,* Part III.

These solutions are introduced into the Pharmacopœias for the purpose of testing the presence of hydrochloric acid, or chlorides in any preparations; also the presence of phosphoric acid in the

phosphate of soda; likewise for ascertaining the existence, and estimating the quantity, of iodine in the iodide of potassium. In a solution containing hydrochloric acid, or any other chloride, a white curdy precipitate is thrown down, which is insoluble in hot nitric acid, but dissolved by ammonia and by cyanide of potassium.

With phosphoric acid, as it occurs in the ordinary phosphate of soda, it throws down a yellow precipitate, which is entirely soluble in nitric acid, and hence easily distinguished from the chloride. With iodine, nitrate of silver also gives a yellow precipitate, insoluble in ammonia.

AURUM, Lond. *Gold.*

For properties and medicinal action, see Part II.

Gold in the metallic state, as gold-leaf, is introduced into the Pharmacopœia for the purpose of detecting the presence of free chlorine in hydrochloric acid, which, if present in that liquid, acts upon the metal when heated, and the gold salt thus formed can afterwards be shown to exist by the addition of protochloride of tin, which, with the gold, forms an insoluble purple compound, the purple of Cassius.

BARII CHLORIDUM (Crystalli), Lond. *Chloride of Barium (in crystals).*

LIQUOR BARII CHLORIDI, Lond. *Solution of Chloride of Barium.*

BARYTÆ NITRAS, Edin. *Nitrate of Baryta.*

SOLUTIO BARYTÆ NITRATIS, Edin. *Solution of Nitrate of Baryta.*

The composition, preparation, and medicinal action of the baryta salts have been discussed under the head of *Metallic Preparations*, Part III.

The solutions are employed for the purpose of detecting the presence of sulphuric acid, or sulphates, in any liquid. When such occur, a sulphate of this base is thrown down in the form of a dense white precipitate, which can be readily distinguished from any other precipitate from its being unacted upon by boiling nitric acid.

CUPRUM, Lond. *Copper.*

Metallic copper (in slips) is ordered by the London College to be employed for the purpose of ascertaining the presence of silver in the nitrate of that metal. If a bright slip of copper is placed in a solution of this salt, metallic silver is precipitated upon it, which can be distinguished from a mercurial stain by its not being reduced, by rubbing, to the state of globules, and not being driven off by the application of heat. It is also used to detect

nitric acid, if present, in *Acidum phosphoricum dilutum.* Metallic copper is also very useful, when employed according to Reinch's method, for detecting arsenic in solutions: the mode of using it, in such cases, has been already detailed in Part II., under *Arsenic.*

CURCUMA, Lond. *Turmeric.*

The composition of turmeric is given in Part II. The mode of using this drug as a test is as follows: — A strong tincture is formed by digesting the rhizome in rectified spirit, by which means the colouring matter is extracted. Strips of unsized paper are then to be brushed over with the tincture, which stains them of a yellow colour: when these are immersed in a solution having an alkaline reaction, the yellow colouring matter contained in them is turned to a reddish brown. The indications of these papers are by no means so delicate as that of the reddened litmus, nor so free from objections; as they are changed to a brownish colour by boracic and some of the concentrated mineral acids. Turmeric is ordered by the London College in testing *Liquor ammoniæ, Liquor ammoniæ acetatis, Ammoniæ sesquicarbonatis, Cupri ammoniæ sulphas, Ferri ammonio-citras, Ferri potassio-tartras, Magnesia, Magnesiæ carbonas, Potassæ acetas, Potassæ bicarbonas, Potassæ carbonas, Potassæ tartras, Potassii iodidum, Sodæ bicarbonas, Sodæ carbonas, Liquor sodæ chlorinatæ, Sodæ phosphas, Sodæ potassio-tartras, Sodæ sulphas.*

ICHTHYOCOLLA, Lond. *Isinglass.*

Its nature and medical properties have been described in Part II. As a test it is employed to distinguish tannic from gallic acid. When a solution of isinglass, or any other form of gelatine, is added to a solution containing tannic acid, a curdy white precipitate (*Tanno gelatine*) is formed; with gallic acid no such precipitation ensues. Again, when isinglass, or any other gelatine yielding tissue, is suspended in a solution containing tannin or tannic acid, the acid unites with the gelatine, and the whole is thus withdrawn from the liquid.

LACMUS, Lond. *Litmus.*

For properties, see Part II., *Rocella.*

For the purpose of using this substance as a test, a tincture is made, and unsized paper is brushed over with it, which stains it of a light blue colour. In neutral or alkaline solutions the tint is unaltered, but the slightest amount of acid changes its colour to red. It is ordered by the London College in testing *Acidum hydrocyanicum dilutum, Æther, Liquor ammoniæ acetatis, Chloroformyl, Ferri ammonio-citras, Ferri potassio-tartras and Potassæ acetas, Oleum æthereum, Potassæ bitartras, Potassæ tartras, Potassii iodidum,*

Sodæ potassio-tartras, Sodæ sulphas, Sulphur precipitatum, Spiritus ætheris nitrici.

If the blue litmus papers are steeped in a very weak acid solution, their colour becomes lilac or slightly red; and if afterwards dried, they become a most valuable test of the presence of alkalies, a solution of which restores their blue colour.

LIQUOR CHLORINII (recens præparatus), Lond. *Solution of Chlorine (recently prepared).*

Its mode of preparation has been described in Part III., *Preparations of Chlorine.* As a test it is employed by the London College for the purpose of recognizing certain alkaloids: thus, if to a solution containing quina, liquor chlorinii is added, and afterwards ammonia, in excess, the colour becomes dark green; whereas cinchonia only produces a brownish colour. Again, if morphia be the alkaloid in solution, and the mode of proceeding the same as before, the liquid assumes a brown tint.

LIQUOR INDIGO SULPHATIS, Lond. *Solution of Sulphate of Indigo.*

Indigo is the colouring matter obtained from several species of Indigofera, growing in India and other warm climates. By fermentation of the leaves of these plants a yellowish colouring matter is dissolved out, which, by exposure to the atmosphere, becomes insoluble and of a dark blue colour — the indigo of commerce. Sulphate of indigo is made by dissolving indigo in concentrated sulphuric acid, with which it forms a soft mass, soluble in water, and of a deep blue colour. The compound thus produced has been called Sulphindylic acid; and a solution of this in water constitutes the preparation of the Pharmacopœia. The London College orders this test for the purpose of ascertaining whether any free chlorine is present in *Acidum hydrochloricum:* if such exists, the blue colour of the indigo is destroyed by the bleaching property of the chlorine. The test is also ordered to ascertain the value of the *Solution of Chloride of Soda.*

PLATINI BICHLORIDUM, Lond. *Bichloride of Platinum.*

The preparation, composition, and medical properties of this salt are described in Part II. As a test it may be employed to distinguish salts of soda from those of potash, producing an insoluble precipitate with the latter salts, but none with the former. By the London College it is employed in the examination of *Sodæ bicarbonas, Potassæ sulphas,* and *Liquor potassæ.*

POTASSII ET HYDRARGYRI IODO-CYANIDUM, Lond. *Iodo-cyanide of Potassium and Mercury.*

This salt, which is readily formed when a solution of iodide of

potassium is added to a strong hot solution of bichloride of mercury, and the liquid allowed to cool, occurs in the form of pearly micaceous scales, which are pretty freely soluble in hot, but require about fifteen parts of cold water to dissolve them.

They are employed simply for the purpose of detecting a foreign acid in the dilute hydrocyanic acid of the Pharmacopœia. When the acid is free from any such admixture, it produces no action on this double salt, but any other acid causes it to become red from the formation of the red biniodide of mercury. The value of this reaction as a Pharmacopœia test is very slight, for it seems to be a well-ascertained fact that dilute hydrocyanic acid, containing some little mineral acid, is much less liable to decomposition, and hence such addition may be advantageously made.

The composition of the salt is given in Part III., under *Preparations of Potassium.*

SOLUTIO SODÆ PHOSPHATIS, Edin. *Solution of Phosphate of Soda.*

For the formula for preparing this solution, see *Preparations of Sodium,* Part III.

Phosphate of soda, when added to a solution of lead in acetic acid, throws down a white precipitate of the phosphate of lead; also, when added to a neutral solution of magnesia containing ammonia, it causes the precipitation of the ammonio-magnesian phosphate: and it is for the purpose of estimating the amount of lead and magnesia contained in any of their salts that the solution of phosphate of soda has been introduced among the tests of the Edinburgh Pharmacopœia.

STANNI PROTO-CHLORIDUM, Lond. *Proto-chloride of Tin.*

Made by dissolving tin with the aid of heat in hydrochloric acid. This solution possesses the property of precipitating gold in the form of a purple precipitate, the purple of Cassius. By the London College it is used for discovering whether any free chlorine exists in hydrochloric acid; for if such were the case, and gold leaf were digested in it with heat, a portion of the metal would be dissolved, and the subsequent addition of proto-chloride of tin would either colour it purple, or throw down a precipitate, according to the amount of metal dissolved.

TABLE

OF

NEW NAMES;

SHOWING

TO WHAT NAME OF THE FORMER LONDON PHARMACOPŒIA EACH BELONGS.

Former Names.	New Names.
	A.
Aloe - - - -	Aloe socotrina.
Æther sulphuricus - -	Æther.
Amygdala dulcis - - -	Amygdala.
Antimonii sesquisulphuretum -	Antimonii tersulphuretum.
Aqua menthæ pulegii - -	Aqua pulegii.
	B.
Bismuthi trisnitratis - - -	Bismuthi nitras.
	C.
Carbo ligni - - -	Carbo.
Ceratum saponis - - -	Ceratum saponis compositum.
——— sabinæ - - -	Unguentum sabinæ.
Cinchona cordifolia - -	Cinchona flava.
——— lancifolia - -	——— pallida.
——— oblongifolia - -	——— rubra.
Confectio piperis nigri - -	Confectio piperis.
——— rosæ gallicæ - -	——— rosæ.
	D.
Dauci radix - - -	Carota.
Diosma - - - -	Buchu.
Decoctum cinchonæ cordifoliæ -	Decoctum cinchonæ.
——— cinchonæ lancifoliæ -	——— cinchonæ pallidæ.
——— cinchonæ oblongifoliæ -	——— cinchonæ rubræ.
	E.
Extractum aloes purificatum -	Extractum aloes.
——— cinchonæ cordifoliæ -	——— cinchonæ.
——— cinchonæ lancifoliæ -	——— cinchonæ pallidæ.
——— cinchonæ oblongifoliæ -	——— cinchonæ rubræ.
——— colocynthidis compositum	Pilula colocynthidis composita.

FORMER NAMES.	NEW NAMES.
	G.
Guaiaci resina - - -	Guaiacum.
	I.
Infusum cinchonæ - -	Infusum cinchonæ pallidæ.
——— diosmæ - - -	——— buchu.
	L.
Linimentum hydrargyri compositum - - - -	Linimentum hydrargyri.
	M.
Mentha pulegium - -	Pulegium.
Menthæ pulegii oleum - -	Pulegii oleum.
	P.
Pilula ipecacuanhæ composita -	Pilula ipecacuanhæ cum scillâ.
Piper cubebæ - - -	Cubeba.
Pix nigra - - - -	Pix.
	S.
Sodæ sesquicarbonas - -	Sodæ bicarbonas.
Spiritus menthæ pulegii - -	Spiritus pulegii.
	T.
Terebinthina vulgaris - -	Terebinthina.
Tinctura balsami tolutani - -	Tinctura tolutana.
——— camphoræ - -	Spiritus camphoræ.
——— catechu - - -	Tinctura catechu composita.
	U.
Unguentum hydrargyri fortius -	Unguentum hydrargyri.
——— picis nigræ - -	——— picis.

APPENDIX I.

No. I.

OF WATER.

Syn. Aqua (*Lat.*), ὕδωρ (*Greek*), Eau (*F.*), Agua (*S.*), Acqua (*Ital.*), Aae (*Dan.*), A (*Swed.*), Ea, Eha (*old Sax.*), Awe (*Pers.*), Aw (*Welsh*), Aa (*Low Germ.*, *Islandic*), Don (*Ossetes*), Dan (*New Guinea*), Ab (*Shans.*), Abh (*Gaelic*), Immek (*Esquimaux*), Tannee (*Tam.*), Panic (*Duk.*), Mah (*Arab.*), Watoora (*Cyng.*), Ayer (*Malay*), Panicum (*Sans.*), Hai (*Tonquinese*), A (*Gothic*), Inki (*Bornou*), Mane (*Begharmi*), Gowah (*Mandara*), Hary (*Timbuctoo*).

WATER is an agent of great importance, independent of the part it sustains in the magnificent operations of nature. Its efficacy in the cure of disease is indubitable; yet it is not admitted into the list of materia medica of any of the British Pharmacopœias, either in its ordinary state, or in form of mineral water. Under both of these forms it is necessary that its qualities and effects should be known to the medical practitioner.

a. COMMON WATER.

THE usual appearance of water is too well known to require description. It retains its fluidity under the ordinary pressure of the atmosphere, at any degree of temperature between 32° and 212° [1], Fah.: under 32° it crystallizes, becomes solid, and is changed into ice; above 212° [2] it becomes steam, expanding to 1698 times its ordinary bulk. One cubic inch of pure water at 60°, and under a pressure of the atmosphere indicated by 30° of the barometer, weighs 252·42 grains, or nearly $\frac{1}{15}$ part of a grain less than two hundred and fifty-two grains and a half.

Although water is almost universally diffused over the surface of the earth, yet it is not found perfectly pure in any place; which is owing to its great solvent powers enabling it to take up a portion of many things with which it comes into contact in its natural state. These impregnations, however, are not sufficient in general to give it any very sensible taste or odour, or to render it unfit for the ordinary purposes of life; and it is in this state that common water is usually obtained. Common water varies considerably according to the source whence it is derived, and other circumstances; but all the varieties may be reduced under the three following heads: —

1. Rain water — *Aqua pluvialis.*
2. Spring water — *Aqua fontana.*
3. River water — *Aqua fluviatilis.*

1. RAIN WATER is the purest kind of natural water; nevertheless, in every 100 cubic inches, it contains in solution about $3\frac{1}{2}$ cubic inches of air, rather more oxygenous than common atmospherical air, and about one cubic inch of carbonic acid gas, besides minute portions of carbonate of lime and sulphate of lime. Its specific gravity scarcely differs from that of distilled water; it is sufficiently pure for most pharmaceutical purposes.[3] When rain water, however, is collected in towns, or from the roofs of houses, besides the small portion of sulphate of lime, it contains soot and other impurities, and requires to be boiled and filtered.

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[1] This degree varies according to the pressure of the atmosphere. Thus, in Gemmilaro's hut, on the side of Etna, about 11,332 feet from the level of the sea, Dr. Irvine found that water boiled at 191°. Vide *Letters on Sicily*, 8vo. p. 153.

[2] Gay Lussac.

[3] Morveau, *Annales de Chimie*, xxiv. 320.

Snow Water, when newly melted, is destitute of air, which is the reason that fish cannot live in it; but when allowed to remain for some time exposed to the atmosphere it does not differ in its qualities from rain water.

2. SPRING WATER, if it have not filtered through a very soluble soil, is almost as pure as rain water. The best springs are those which rise through sand or gravel at a small depth.[1] It generally contains, besides the ingredients which are found in rain water, a small portion of chloride of sodium.

Well or Pump Water, which is spring water obtained by digging to a considerable depth, is by no means so pure. It is commonly distinguished by a property named hardness, implying an incapability of dissolving soap[2], which is owing to its containing many earthy salts, the principal of which is sulphate of lime. It also contains more carbonic acid gas than common spring water. Many of the foreign ingredients contained in hard water are simply suspended in it; for pump water is rendered softer and purer by only passing it through a filtering-stone. The best mode of freeing hard water of its earthy salts is first to boil it; then, after it has cooled, to drop into it an alkaline carbonate; and, lastly, to filter it. It cannot be employed for pharmaceutical purposes.

3. RIVER WATER, when the stream is rapid, and runs over a pebbly channel, is as pure as soft spring water; but when the current is slow, and the bed clayey, it approaches nearer to the nature of well water, and frequently contains putrefied vegetable and animal matters, as is generally the case in the water of lakes.

Such are the foreign ingredients contained in *common water:* distillation in glass vessels frees it entirely from these ingredients, and it is obtained almost perfectly pure, transparent, colourless, insipid, and inodorous.

The varieties of waters enumerated above may be almost indiscriminately employed as diluents, the small proportion of foreign ingredients they contain occasioning no difference in their diluent properties. When the quantity of sulphate of lime and aluminous matter, however, is very considerable, as is the case in the water of many pumps, there is some reason for concluding that deleterious effects may arise from the use of the water; although it may be doubted whether the scrofulous and glandular swellings, peculiar to some populous towns, can be justly ascribed to this cause.[3] Even a few of the waters which are regarded as mineral waters owe more to the diluent property of the water for their efficacy than to the impregnations they contain. This is particularly the case with the Malvern spring, which has been found to contain very little foreign matter. The diluting power of water is much modified by temperature; warm or tepid water being a much better diluent than cold water.

The medicinal properties of water as a diluent were well known to the ancients; and cold water, used as a drink in fevers, was the principal remedy of the father of physic in these complaints. The temperature of 60° is the proper degree, when it is intended that water should produce its diluent effects without the aid of heat. Under 45° it produces a sedative and astringent effect; above 60° and under 100°, it relaxes the fibres of the stomach, and is apt to induce nausea, particularly when bulk is added to this range of temperature; but at a higher temperature, the stimulus of heat, in the same manner as the addition of other stimulants, prevents that effect. Simple water may supersede the use of all other diluents; but animal and vegetable infusions are generally employed: thus, toast and water (*infusum panis tosti*) is more agreeable to most palates, and is an excellent diluent in fevers and inflammatory diseases. The temperature of water as a diluent should be regulated by the nature of the disease; in internal hæmorrhages the temperature should not exceed 45°, but it may be 60° in fevers; unless in the cold stage of the paroxysm of fever, when thirst should be allayed by tepid, or warm water, or other bland fluids; and the same precaution is necessary when the sweat has become general and profuse. In cases in which there exists a morbid increase of bile, disturbing the functions of the stomach and irritating the

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[1] The water conveyed to Hoddesdon, in Hertfordshire, rises through a fine white sand, and is so pure, that Dr. Hales affirms it left no incrustation in a boiler which had been in constant use for fifteen years. *Statistical Essays*, ii. 242.

[2] Soap when agitated with hard water is decomposed; the alkali of the soap uniting with the acid of the earthy salts, while the oil and earths combine, and form new, nearly insoluble soaps, which swim in a curdy form on the surface of the water.

[3] Percival ascribes the glandular swellings common in Manchester to this cause. See *Essays*, i. 291.

bowels, the temperature of the water used as drink may be from 90° to 114°; and in some cases of dyspepsia, which are attended with the sensation of coldness at the stomach, and with cold extremities, a cupful of water, taken as hot as it can be drunk, affords very considerable relief. In cases of redundant bile, by drinking half a pint of tepid water every morning before breakfast, and taking immediately afterwards moderate exercise, the acrid bile is diluted, and its passage through the bowels assisted, without the irritation which, in its undiluted state, it always excites; and it produces the same benefit in cholera morbus in the commencement of the disease, the stomach being rendered by it more fit to receive opiates and other remedies. Some medicines, as sudorifics, diuretics, and emetics, scarcely produce their effects unless their operation be assisted by copious dilution with water, or watery fluids.

Water is also an external remedy of great importance, but its effects are much modified by the degree of temperature at which it is applied.

COLD WATER, or of a temperature under 70°, gives the sensation of cold to the skin, and is applied under the form of *bath* and of *affusion.*

The cold bath (*balneum frigidum*) is water of any temperature, from 42° to 85° of Fahrenheit. When the body is immersed in it, it first induces the sensation of cold, excites shivering, renders the skin pale, and contracts it so as to produce the appearance denominated goose skin (*cutis anserina*); the respiration at the same time is quickened, rendered irregular, and sobbing occurs. The pulse is diminished in force and velocity, but is rendered firmer and more regular. If the immersion be not long continued, reaction takes place on coming out of the bath; a glow, or agreeable sensation of heat, is felt over the whole body, the tone and vigour of the muscles are increased, a buoyancy of spirit and aptitude for action succeed, and a sense of general refreshment is experienced by the bather. The protraction, however, of the immersion for a considerable space of time, particularly if the temperature of the bath be under 50°, is not followed by this reaction, but the cold water operates as a powerful sedative; the action of the heart and arteries becomes languid, the pulse ceases at the wrist, the animal heat is rapidly diminished, and a sensation of coldness at the stomach is felt, which is succeeded by faintness, delirium, torpor, and sometimes death. These unpleasant effects are occasionally experienced in some degree, even when the immersion is not protracted, and the temperature of the bath is not under 60°; in which case cold bathing proves always hurtful, and ought not to be repeated: but when the contrary effects are experienced, it is found to be useful in many diseases of debility, particularly in scrofula, if the water be impregnated with salt, or sea-bathing be resorted to. The debilitated, however, in whom the use of sea-bathing produces these effects, when it is employed before breakfast, are not always affected in the same manner when it is used after breakfast, or when the stomach is full; but, on the contrary, they receive the same benefit from it as those with whom it agrees at all times. The use of cold water as a general bath is never employed with a view of producing its sedative effects; but for this purpose it is partially applied, either by the immersion of the affected parts, or by means of cloths dipped in very cold water, and laid over or near the parts. It is used as a remedy in active uterine hæmorrhages, burns, and scalds, and in local inflammations, even when arising from general disease, as gout and acute rheumatism, when the surface of the pained part appears red and inflamed; and in inflammation of the brain or its membrane, in which case it is either applied to the shaved scalp, or dropped upon the vertex.

The cold affusion, or the suddenly pouring cold water over the whole surface of the body, operates as a powerful remedy, although its effects as such are of short duration. They are produced by the suddenness of the application affecting the nervous energy, and by the shock rousing the dormant sensibility, so as to induce a new action, as it were, of the nervous system, carrying off a large portion of morbid heat by general evaporation, and exciting insensible perspiration; thence restoring the healthy action of the exhalants and the capillaries. In typhus fever this mode of applying cold water has been productive of the best effects.[1] It should be resorted to in the first hot stage of

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[1] The cold affusion was employed by Antonius Musa, physician to Augustus, when that emperor was affected with a bowel complaint, which had resisted every other remedy. *Vide Q. Horatii F. Epistol. ad Num. Valam. C. Sueton. Tranq. Octavius Aug.* ii. cap. 81. p. 104. Cold affusions in the fevers of Asia are also prescribed by the Koran, and used in India by the Mahometan and Hindoo physicians in various diseases.

the disease, if possible, and repeated every time the morbid heat returns. If the water can be impregnated with salt, so much the better; but when the disease is advanced, its temperature should not be more than 26°[1] under that of the body. It often suddenly arrests the disease, if it be used during the three first days, or so late even as the fifth; but after this period it can be regarded as a useful auxiliary only, even when properly employed. In tetanus, Currie affirms[2] that the cold affusion also proves useful, particularly when the shock is considerable, and applied during the convulsions. It is, however, in idiopathic tetanus only that it proves beneficial, no advantage being obtained from using it in tetanus arising from wounds.[3] Its utility has also been proved in many of the exanthemata: for instance, during the hot stage of the eruptive fever of small-pox; and we can bear ample testimony to its efficacy in scarlatina maligna, when the heat rises to above 100°.[4] This remedy, however, is productive of much mischief when misapplied; and therefore it is necessary to observe, that it is contra-indicated in the cold stage of fevers, and when a sense of chilliness is present, although the thermometer indicate the real heat to be more than natural. It may prove injurious, also, when the patient displays much dread of the affusion. It is also said to be improper in fevers, when diarrhœa or dysentery is present; after the sweating stage in intermittents is formed; after the eruption is completely formed in confluent small-pox; and in symptomatic fever occasioned by great local inflammation. Dr. A. Nicoll found it useful in India, in remittent and intermittent fevers, accompanied with *dysentery;* when the heat of the surface exceeded 98° Fahrenheit; for as in these cases the dysenteric symptoms seem to depend on the degree of febrile excitement, the cold water, by producing a solution of these, allays the griping and tenesmus, and natural stools follow. The affusion should always, in such cases, be preceded by bleeding and other depletory means.[5] The water should be dashed from a moderate height; and its temperature should be nearly that of the air at the time. The cold affusion, in the form of the shower-bath, is advantageously employed as a stimulant and tonic in diseases of general debility. I know of no remedy so generally useful in those affections which are known by the name of nervous complaints.

WARM WATER, or of a temperature from 86° to 100°, gives the sensation of warmth to the body, and is applied both locally and generally in the form of vapour, fomentation, and bath. Water is found in a state of nature combined with different quantities of caloric within the above range of temperature. In the Buxton hot springs the temperature is about 82°; at Bristol it is from 74° to 84°; and at Bath the range is from 110° to 114°.[6] The necessary degree of temperature, however, is generally obtained by artificially heating the water.

The general application of warm water is by means of baths. When the greater part of the entire body is immersed, the water constitutes properly a bath (*balneum*); but when half only is immersed, it is a half bath (*semicupium*). The bath may be either

a. The hot bath (*balneum calidum*), from 97° to 106°.
b. The tepid bath (*balneum tepidum*), from 86° to 96°.
c. The vapour bath (*balneum vaporis*), from 109° to 130°.

The two first differ in temperature only; but the last, from the water being applied in a very minutely divided state, acts with much greater effect than water in the liquid form. The operation of the first of these forms of applying water is stimulant; it augments the action of the heart and arteries, renders the skin red, quickens respiration, and produces a copious flow of sweat. It also increases the bulk of the body. But the others, although they excite the sensation of heat, yet lessen the frequency of the pulse, relax powerfully the skin and simple solids, and diminish generally increased excitement.

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[1] Currie, *Reports on Cold Water*, i. 31. [2] *Ibid.* i. 138. [3] *Ibid.* i. 159.

[4] Currie gives the following results of the affusion: the heat of the body in fever, as indicated by the thermometer, being 103°, was by it reduced to 98°, in half an hour; and the pulse from 112 to 80 beats (vol. i. 22.); the heat 101° was reduced to 99°; and the pulse from 112 to 98 in the same time. The heat 106° was reduced to 98°; and the pulse from 130 to 90 (vol. i. 46.).

[5] *Lond. Med. Repository*, vol. ix. p. 123.

[6] The temperature of the Cross Bath pump is 110°; the King's Bath 112°; and the Hot Bath 114°.

Warm and vapour baths[1] are efficaciously employed in acute rheumatism, inflammation of the abdominal viscera, of the kidneys, bladder, and uterus; in suppression of urine, and in spasmodic affections, particularly those to which infants are liable, arising from dentition and other irritations. The general relaxation produced by their use has been taken advantage of, also, for assisting the reduction of strangulated hernia; for, although the effect be not topical as it regards the hernial tumour, yet the general relaxation produced gives a disposition to all the parts to regain their proper place. The tepid bath is found to be very useful in the rigidities which follow some acute diseases, as gout and rheumatism, nodosities of the joints[2], and, according to some, the rigidities attendant on old age.[3] Its effects in promoting the natural excretions by the skin render it very serviceable in promoting the cure of herpetic eruptions; of lepra, and in all cutaneous affections, it is a most important auxiliary. It has also been found very beneficial in cases of insanity. In general the period of immersion should not be less than twenty minutes, nor exceed one hour.[4]

The partial application of warm water as a remedy is made by means of

1. *a.* The foot bath (*pediluvium*);
   b. The hip bath (*coxæluvium*); and
   c. The hand bath (*manuluvium*).
2. *d.* Fomentations of vegetable decoctions; and
   e. Flannel cloths wrung out of boiling water, by which the moisture is applied in a state of vapour.

These partial baths are useful in the same diseases for which the general baths are employed; but are better adapted for relieving the rigidity of single joints and topical inflammation; and the hip bath has lately been found to be very beneficial in suppressed menstruation, and for relieving the pains of cancer in utero.

For fomentations it is the practice to employ vegetable decoctions; but the best of these can be regarded only as vehicles for retaining the heat and moisture. At all times, flannel cloths wrung out of boiling water are superior; both because the water is applied in the form of vapour, and also, while they continue as long warm, they do not wet the bed and linen of the patient. The flannel cloths should be each about two yards long, with the ends sewed together, so that by means of two sticks, one being at each end, turned in opposite directions, they may be wrung much dryer, when taken out of the boiling water, than could be effected by the hands. The principal circumstance to be attended to in the application of fomentations is the frequent renewal of them, in order that a steady and constant heat may be applied to the fomented part.

β. MINERAL WATERS.

It has been already noticed, that although no natural water is found in a state of absolute purity, yet that in general the quantity of foreign matters is not sufficient to give any very sensible taste or odour. In some instances, however, the foreign matter is so considerable, and of such a nature, as to prevent the water from forming a part of the nourishment of animals; in which case it is denominated a MINERAL WATER, and can be useful to mankind only in a medicinal point of view.

Mineral waters may be arranged into the five following classes: — 1. ACIDULOUS WATERS; 2. ALKALINE WATERS; 3. CHALYBEATE; 4. SULPHUREOUS WATERS; 5. SA-

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[1] The simplest vapour bath is formed by placing a bucket of boiling water close to a chair on which the patient is seated, and surrounding the bucket, the chair, and the patient with a blanket pinned round the throat of the latter. A hot brick thrown into the water renews the evolution of the vapour.

[2] Haygarth, *Clinical History of Diseases*, 8vo. Lond. 1805.

[3] Tepid bathing with friction is said by one author, "vitam sæpe per plures menses, interdum etiam per aliquot annos, protraxisse." — Gregory, *Conspectus Med.* ii. 100.

[4] The Arabian physicians used the vapour bath in a singular mode, in scrofulous affections, which they denominated Bother: — "ponatur sub puero olla plena aquâ calidâ, in principio apparitionis pustularum, ut attrahat ab interioribus superfluum humorem ad corporis superficiem." — *Rhazes de Morbis Infant.* cap. 19., by Willan, p. 31.

LINE WATERS. I shall first give a sketch of the physical characters and medicinal properties of each of these classes; and then describe the method of determining the ingredients, and their proportions, contained in any mineral water.

1. ACIDULOUS WATERS owe their properties chiefly to carbonic acid. They sparkle when drawn from the spring, or when poured into a glass; have an acidulous taste, and become vapid when exposed to the air. Besides free carbonic acid, on the presence of which these qualities depend, acidulous waters contain generally also bicarbonate of soda, bicarbonates of lime, of magnesia, and sometimes of iron.

They may be divided into *thermal*, or *warm acidulous waters*, and *cold acidulous waters;* the temperature of the former, however, does not exceed 72°, while that of the latter is generally about 55°.

Of this kind are the springs of Cleves, Carlsbad, Kissingen, Fachingen, Marienbad, Geilnau, Rippoldsau, Soden, and Tonstein, in Germany; Languac, Upper Loire; Passi, near Paris; Wisbaden in Nassau; and Bandola in Italy; Granshaw in Ireland; Orston and Thorston, Nottinghamshire; Stonefield, Lincolnshire; but the most celebrated springs of this class are Pyrmont, Seltzer, Spa, and Carlsbad. They are tonic and diuretic; and in large doses produce a sensible degree of exhilaration. They all afford a grateful and moderate stimulus to the stomach; but the Pyrmont and Spa, containing traces of carbonate of iron, are especially useful in all cases of impaired digestion; while those which contain alkaline carbonates, as the Carlsbad and Seltzer, are more particularly employed as palliatives in calculous affections.

2. ALKALINE WATERS owe their properties to a free alkali or one very slightly carbonated. They display an alkaline reaction. But alkaline springs, except those in which there is an excess of carbonic acid, are not very numerous.

3. CHALYBEATE WATERS owe their properties to iron, in combination generally with carbonic acid; and as this is usually in excess, they are often acidulous as well as chalybeate. The metal is found also in the form of a sulphate, but the instances of this are rare.

Chalybeate waters have a styptic or inky taste; they are, when newly drawn, transparent, and strike a black with tincture of nut-galls; but an ochry sediment, a hydrated peroxide of iron, soon falls, and the water loses its taste. If the iron be in the state of sulphate or chloride, however, no sediment falls; and the black colour is produced by the above test, even after the water has been boiled and filtered. Chalybeate springs are very numerous. On the Continent are those of Abcourt, St. Germain; Aumale and Forges, near Rouen; Bologna; Buzot, in Spain (*a warm spring*); Caroline baths, Bohemia; Daswild, Baden, Germany; Driburgin, Westphalia; Naptha, in Russia; Nisdeniee, in Germany; Swalbach, in Nassau; Ponges, Hassenfratz; Perekop, Russia; Sarepta, Russia; Scolliensis, Switzerland; Suchalda, Hungary; and Vechy, near Moulins. There are many chalybeates in Great Britain; as, for instance, those of Arbroath and Peterhead in Scotland; Ashton, in Wiltshire; Balemore, Worcestershire; Ballycastle, Antrim; Ballynahinch, Down; Ballyspellan, Kilkenny; Bandon, Cork; Bromley, Kent; Brownstown, Kilkenny; Castlecomer, Kilkenny; Castleconnel, Limerick; Castlemain, Kerry; Coalcullen, Kilkenny; Corville, Tipperary; Coventry; Crosstown, Waterford; Doneraile, Cork; Dunnard, Dublin; Galway; Garry-hill, Carlow; Haigh, Lancashire; Hampstead; Hartfell, Scotland; Islington; Kilcoran, Clare; Kilagee, Down; Kirby, Westmoreland; Lancaster; Llandridad, Wales; Luz, Essex; Listerlin, Kilkenny; Milltown, Mallay, Clare; Newton Stewart, Tyrone; Oakfield, Cavan; Phœnix Park, Dublin; Scool, Clare; Shadwell, near London; Somersham, Huntingdonshire; and many others: but the most celebrated are Tunbridge, Brighton, and Peterhead; the Cheltenham spring also contains carbonate of iron; but on account of the large proportion of saline matter, and its strong purgative properties, it is not ranked in this class. The Spa springs also belong to this class.

Chalybeate waters are powerful tonics, and are employed in dyspepsia, scrofulous affections, cancer, amenorrhœa, chlorosis, and the other diseases of debility for which the artificial preparations of iron are used. Much of the benefit derived from the use of chalybeate waters depends on the extreme division of the metallic salts they contain, as well as the vehicle in which it is held in solution; while at the same time their operation is much modified by the carbonic acid by which the iron is suspended. When the water is a carbonated chalybeate, it should be drunk the moment it is drawn from the spring; but the same precaution is not necessary with a water containing sulphate of iron.

4. SULPHUREOUS WATERS derive their character chiefly from sulphuretted hydrogen

gas; which in some of them is uncombined, while in others it is united with lime or an alkali. They are transparent when newly drawn from the spring, and have the fœtid odour of rotten eggs, which is gradually lost by exposure to the air, and the water becomes turbid. When they are strongly impregnated with the gas, they redden infusion of litmus; and, even in a weak state, they blacken silver and lead. Besides containing sulpuretted hydrogen gas, they are not unfrequently, also, impregnated with carbonic acid. They generally contain chloride of magnesium or other saline matters, which modify their powers as a remedy.

The most important sulphureous springs in this island are those of Kilburn, Harrowgate, and Moffat; but the following are also of some note: Annaduff, Leitrim; Askeron in Yorkshire; Broughton in Yorkshire; Clonmel, Tipperary; Codsalwood, Staffordshire; Derrylister, Cavan; Drumasnane, Leitrim; Dudley, Worcestershire; Kedleston, Derbyshire; Killashen, Fermanagh; Loansbury, Yorkshire; Maudley, Lancashire; Nottington, Dorsetshire; Ripon, Yorkshire; Shapmoor, Westmoreland; Wardrew, Northumberland; and Wirksworth in Derbyshire. On the Continent, Aix-la-Chapelle; Barèges; Baden; Baia, Italy; Dux, Bayonne; Ems, Germany; Montmorency, near Paris; Motte, near Grenoble; Viterbo in Italy; and St. Amands, near Valenciennes; which are resorted to chiefly for the cure of cutaneous eruptions, and are applied locally as well as drunk. They are slightly sudorific and diuretic, and are apt to occasion in some patients headache of short duration directly after they are drunk. They are also employed for curing visceral and scrofulous obstructions, torpor of the intestines, aad some dyspeptic and hypochondriacal cases.

5. Saline Mineral Waters owe their properties altogether to saline compounds. Those which predominate, and give their character to the waters of this class, are either,

1. Salts, the basis of which is lime;
2. Chlorides of sodium and magnesium;
3. Sulphate of magnesia;
4. Alkaline carbonates; particularly carbonate of soda.

Many of them are purgative, the powers of the salts they contain being very much increased by the large proportion of water in which they are exhibited. The most celebrated saline springs are those of Cheltenham, Leamington, Bristol, Kinalton, Pancras near London, Scarborough, Sydenham, and Thursk in Yorkshire, in England; Pitcaithly, in Scotland; Carlsbad, Pullna, Seidschutz, and Seidlitz, on the Continent. They are employed in diseases which require continued and moderate intestinal evacuations; such as dyspepsia, hypochondriasis, chronic hepatitis, jaundice, and strumous swellings. They are more grateful to the stomach when carbonic acid also is present; and when they contain iron, as in the case of the Cheltenham spring, their tonic powers, combined with their purgative qualities, render them still more useful in dyspeptic complaints and amenorrhœa.

To this class the water of the ocean belongs. The quantity of saline matter Sea Water contains varies in different latitudes; thus, between 10° and 20° it is rather more than $\frac{1}{24}$th; at the equator it is $\frac{1}{25}$th; and at 57° north it is only $\frac{1}{27}$th. The saline ingredients in 10,000 parts of sea-water, according to the last analysis of Dr. Murray[1], are, chloride of sodium, 220·01; chloride of calcium, 7·84; chloride of magnesium, 42·08; and sulphate of soda, 33·16. When brought up from a great depth its taste is purely saline; but when taken from the surface it is disagreeably bitter, owing perhaps, to the animal and vegetable matters suspended in it. Its specific gravity varies from 1·0269 to 1·0285; and it does not freeze until cooled down to 28·5° Fahrenheit. Its medicinal properties are the same as those of the saline purging waters, but more powerful; and as a bath its efficacy is much superior to that of fresh water.

The following Table gives the known contents of the most celebrated mineral waters. Many more have been analysed, but it is unnecessary to introduce an account of them in this place; and I consider it to be of more importance to describe the method of determining the nature and proportion of the substances, or the analysis of mineral waters, one of the most difficult parts of practical chemistry.

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[1] *Edinburgh Transactions*, vol. viii. p. 205. The water was taken from the Frith of Forth, and was of the specific gravity, 1·029.

Table of the more celebrated Mineral Waters, showing the Ingredients contained in each Water.

	Names of the Springs.	Quantity of Water.	Gases.				Carbonates of				Sulphates of				Chlorides of				Silica.	Ammonia.	Resin.	Temperature.
			Oxygen.	Carb. Acid.	Sulp. Hydr.	Nitrogen.	Soda.	Lime.	Magnesia.	Iron.	Soda.	Lime.	Magnesia.	Iron.	Soda.	Lime.	Magnesia.	Potash.				
		grains.	cubic in.	cubic in.	cubic in.	cubic in.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	grains.	
Acidulous.	Seltzer	8949	·435	13·068	—	—	5·22	78·3	6·32	—	—	—	—	—	13·74	—	—	—	—	—	—	cold
	Pyrmont	8950	—	19·6	—	—	—	4·3	9·8	0·70	—	8·38	5·44	—	1·7	—	—	—	—	—	—	cold
	Spa	8933	—	9·8	—	—	1·85	1·85	4·35	0·70	—	—	—	—	0·21	—	—	—	—	—	—	cold
	Carlsbad	25320	—	50·	—	—	38·5	12·5	—	1·50	66·75	—	—	—	32·5	—	—	—	2·25	—	—	165°
	Kilburn	138240	—	84·	36·	—	—	2·4	1·25	0·3	18·2	13·0	91·0	—	6·0	0·6	2·8	—	—	—	6·	cold
	Ponges	7291	—	30·	—	—	10·	12·	1·2	2·5	—	—	—	—	2·5	—	—	—	0·5	—	—	cold
	St. Parize	7291	—	22·	—	—	—	11·5	0·5	—	—	13·	—	—	—	—	—	—	—	—	—	cold
	Ems	7291	—	51·	—	—	10·75	1·14	0·8	0·026	6·	—	—	—	7·634	—	—	0·04	60·4	—	—	117°
	Marienbad	7291	—	125·	—	—	8·26	4·13	3·05	0·176	39·72	—	—	—	12·45	—	—	—	0·88	0·75	—	cold
	Anschowitz	7291	—	149·56	—	—	6·197	4·016	2·4	0·4	22·544	—	—	—	8·996	—	—	—	0·669	—	—	cold
	Eger	7291	—	154·	—	—	5·00	—	0·600	0·350	25·50	—	—	—	7·96	—	—	—	0·558	—	—	cold
	Geilnau	7291	—	163·3	—	—	6·62	2·97	2·170	—	0·042	—	—	—	0·543	—	—	—	0·26	0·247	—	cold
	Kissengen	7680	—	26·3	—	—	0·82	7·250	2·500	0·680	2·000	2·500	—	—	62·050	—	6·850	—	2·250	—	—	cold
Sulphureous.	Harrowgate	103643	—	8·	19·	7·	—	18·5	5·5	—	—	—	0·5	—	615·5	3·	9·1	—	—	—	—	cold
	Moffat	103643	—	1·	10·	4·	—	—	—	—	—	—	—	—	3·6	—	—	—	—	—	—	cold
	Aix-la-Chapelle	8940	—	—	13·06	—	—	15·25	5·89	—	—	—	—	—	6·21	—	—	—	—	—	—	143°
	Enghien	92160	—	18·5	70·	—	—	21·4	1·35	—	—	33·3	5·8	—	2·4	—	8·0	—	—	—	—	cold
	Cheltenham Sulphur Spring	7291	—	—	1·5	—	—	—	—	0·3	23·5	1·2	5·	—	35·	—	—	—	—	—	—	cold
Saline.	Seidlitz	58309	—	8·	—	—	—	6·7	21·	—	—	41·1	14·44	—	—	—	36·5	—	—	—	—	cold
	Cheltenham	103643	—	30·3	3·	12·	—	—	12·5	5·	48·0	40·	—	—	5·	—	12·5	—	—	—	—	cold
	Plombieres	—	—	—	—	—	4·4	1·	—	—	4·7	—	—	—	0·5	—	—	—	2·6	—	—	cold
	Leamington	5760	—	—	—	—	—	—	—	—	7·83	—	—	—	53·75	28.64	20·16	—	—	—	—	cold
	Bristol	7291	—	3·5	—	—	—	1·5	—	—	—	1·5	1·5	—	0·5	—	1·	—	—	—	—	74°
	Scarborough	7291	—	—	—	—	—	—	—	—	—	20·	9·	—	—	—	—	—	—	—	—	cold
	Barèges	7291	—	—	—	—	2·5	—	—	—	—	—	—	—	0·5	—	—	—	—	—	—	120°
	Baden-Baden	7680	—	0·5	—	—	—	1·670	0·250	0·100	—	3·000	—	—	16·00	1·740	0·250	—	0·330	—	—	cold
Chalybeate.	Tunbridge	103643	1·4	10·6	—	4·	—	—	—	1·	—	1·25	—	—	0·5	—	2·25	—	—	—	—	cold
	Toeplitz	22516	—	—	—	—	13·5	16·5	—	32·5	—	—	—	—	61·3	28·5	—	—	—	15·1	—	cold
	Brighton	7291	—	2·2	—	—	—	—	—	1·4	—	4·	—	—	3·	—	0·75	0·14	—	—	—	cold
	Swalbach	7680	—	26·0	—	—	0·175	2·110	3·125	0·835	0·600	—	—	—	0·186	—	—	0·910	—	—	—	cold
Calcareous, nearly pure.	Bath	15360	—	2·4	—	—	—	1·6	—	·004	3·	18·	—	—	6·6	—	—	—	0·4	—	—	114°
	Buxton	58309	—	—	—	2·	—	10·5	—	—	—	2·5	—	—	1·5	—	—	—	—	—	—	82°
	Matlock	58309	—	—	—	—	—	—	—	—	—	min. por.	—	—	—	—	—	—	—	—	—	96°
	Malvern	58309	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	cold
	Ems	7680	—	—	—	—	20 00	2·010	2·000	—	1·000	—	—	—	8·000	0·500	0·250	—	—	—	—	118°

The general effects of mineral waters are modified by temperature, whether they be taken internally, or are externally applied. In some springs, as those of Bath, Matlock, Buxton, Wildbad in Germany, Bagnols in France, Bonnes in the Lower Pyrenees, Borset near Aix-la-Chapelle, Canteries in the Upper Pyrenees, Digne in the Lower Alps, Klintschysela in Russia, Lucca in Italy, Plombieres in Lorraine, and Pont-gibault in France[1]; their virtues depend almost altogether on temperature; and in others, as Malvern, which have been found to contain scarcely any foreign matter, the simple diluent power of the pure water seems to produce the benefit that results from drinking them. Some of the good effects of all of them, however, must be allowed to proceed from change of scene, relaxation from business, amusement, temperance, and regular hours; and in these circumstances, the drinking the waters at the springs possesses advantages which cannot be obtained from artificial waters, however excellent the imitations may be; nor even from the natural waters, when bottled and conveyed to a distance from the springs.

METHOD OF ANALYSING MINERAL WATERS.[2]

THE first circumstance to be attended to in the chemical examination of any mineral water is to determine the temperature of the springs, whether they are to be ranked with *thermal* or *cold springs*.[3] The next is the gross weight of the substances held in solution. This is to be done by first ascertaining the specific gravity of the mineral water; then subtracting from it the specific gravity of the distilled water (both expressed in whole numbers), multiplying the remainder by 1·4. The product is the gross saline contents, in a quantity of the water denoted by the number employed to indicate the specific gravity of distilled water.[4] Thus, if the specific gravity of the mineral water be 1·079, as that of distilled water is 1·000, the remainder, after the subtraction of the latter from the former, in whole numbers, will be 79, which, multiplied by 14, makes 1106; and, therefore, 110·6 is the sum of the saline contents of 1000 parts of the water; or 11·06 are contained in 100 parts. The next step is to ascertain the nature and the proportion of each ingredient.

1. The AËRIAL or GASEOUS BODIES are to be first separated by boiling for a quarter of an hour as much of the water as will fill two thirds of a glass retort, connected with an inverted jar, divided into cubic inches and tenths, full of mercury, and placed in a mercurial trough. The air and gases will pass over into the jar, and depress the mercury; and when cool, after subtracting the air of the retort, the quantity of air expelled from the water may be easily determined.

The only gaseous bodies contained in water are atmospheric air, oxygen gas, nitrogen gas, carbonic acid gas, sulphuretted hydrogen gas, and sulphurous acid; of which the following cannot exist together in the same water:

Oxygen gas and sulphuretted hydrogen gas,
Sulphuretted hydrogen gas and sulphurous acid.

a. *Sulphuretted hydrogen gas* is known to be contained in water by its peculiar odour, by the water becoming turbid when exposed to the air, and depositing sulphur, by its reddening litmus fugaciously, blackening paper dipped in a solution of acetate of lead, and precipitating nitrate of silver black or brown. It may be

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[1] See, for a very full table of mineral waters, *Dr. Ryan's Essay on the Nat. Hist. of Water; Med. and Phys. Journ.* vol. liv. pp. 452—461.

[2] The matter on this important subject is chiefly extracted from the System of Chemistry of Dr. T. Thomson.

[3] *Thermal springs.* — Matlock, temperature 68° Fahr.; Bath, 117°: Buxton, 87°; Bristol, 74°; Ems, 118°; Aix-la-Chapelle, 144°; Weisbaden, 151°; Wildbad, 95°; St. Sauveur, 90·2°; St. Nectaire, 105°; Vichy, 113°; Barèges, 112°; Aix, 168°; Pfeffers, 98°; Leuk, 123°; Lucca, 113°; Toplitz, 118°; Cauteritz, 130°; Baden-Baden, 147°.

Cold sulphureous springs. — Moffat, Gilsland, Strathpeffer, Leamington, Cheltenham, Harrowgate.

Warm sulphureous springs. — Barèges, Cauteritz, St. Sauveur.

[4] This useful formula was invented by Mr. Kirwan. See *Essay on Mineral Waters*, 145.

separated from the air obtained from water during boiling, by carrying the jar into a tub of warm water, and introducing nitric acid, which absorbs the sulphuretted hydrogen. The bulk of this gas contained in any water is determined by filling a jar three-fourths with the water, inverting it in a water trough, and introducing nitrous gas at intervals, as long as red fumes appear, or the hepatic odour continues; when the jar is turned up and the air blown out. The nitrous gas in this operation mixing with the common air in the upper part of the jar forms nitrous acid, which renders the water turbid, by decomposing the sulphuretted hydrogen and precipitating sulphur. The bulk of hepatic gas is determined by the weight of the sulphur thrown down, one grain indicating the presence of 3·33 cubic inches of the gas.

b. *Sulphurous acid gas* is ascertained by the same tests which detect the presence of sulphuric acid and water (*which see*).

c. *Carbonic acid gas* is detected by lime-water occasioning a precipitate soluble with effervescence in hydrochloric acid; by reddening fugaciously tincture of litmus, and losing this property when boiled.[1]

To estimate the bulk of these gases, introduce into the air obtained by boiling the water a solution of pure potassa, and agitate the whole gently. These acid gases will be absorbed, and any other gases left; after which, the bulk of the residuum must be estimated, and subtracted from the bulk of the whole to obtain that of the acid gases absorbed. Evaporate next the potassa slowly, nearly to dryness: and, by leaving it exposed to the atmosphere, sulphate of potassa will be formed, which may be separated by dissolving the potassa in diluted hydrochloric acid, and filtering the solution. 100 grains of sulphate of potassa indicate 42·72 cubic inches of sulphurous acid gas, which, being subtracted from the bulk of the gas absorbed by the potassa, leaves the bulk of the carbonic acid gas.

d. *Oxygen gas*, after the above gases are separated, may be examined by means of the solution of sulphate of iron saturated with nitrous gas.[2] A small graduated tube filled with the air to be examined is to be plunged into this solution, and moved backwards and forwards for a few minutes. The whole of the oxygen is rapidly absorbed; and by marking the greatest absorption, its bulk in a given quantity of the air is ascertained.

e. *Nitrogen gas* is detected by not being affected by eudiometrical processes.

2. ALKALIES, and ALKALINE, EARTHY, and METALLIC CARBONATES. Alkalies, even in minute quantities, are discovered in water by rendering infusion of turmeric, or paper stained with it, brown.[3] When the change is permanent, the fixed alkalies may be supposed to be present; when fugacious, the alkali is ammonia. An infusion of Brazil-wood is rendered blue by the alkalies; but this also is the case with the alkaline and earthy carbonates[4], and the addition of sulphuric acid produces effervescence. Tincture of nut-galls discovers iron; the colour is violet if alkaline carbonates or earthy salts be also present; dark purple indicates other alkaline salts; purplish red, sulphuretted hydrogen gas; and whitish and then black, sulphate of lime. Boiling the water precipitates the earthy and metallic carbonates.

The following substances of this class, set down in the first column, are incompatible, or cannot exist in mineral waters, with the salts placed in the opposite column; —

Alkalies - - - -	Fixed alkaline sulphates.
	Alum.
	Sulphate of magnesia.
	——— of iron.
Alkaline carbonates - -	Chloride of barium.
	——— of calcium.
	——— of magnesium.
	Nitrate of lime.

[1] *Acidulous springs.* — Seltzer, Carlsbad, Marienbrunner in Marienbad; Saratoga in the State of New York.

[2] Dr. Henry.

[3] This test is sufficiently delicate to detect soda when it amounts to $\frac{1}{2217}$th part only of the water.

[4] Sulphate of lime likewise produces the same effect.

Earthy carbonates - -	Sulphate of iron. Chloride of barium.
Carbonate of magnesia -	Sulphate of lime. Alum. Chloride of Calcium.

a. *Alkalies and their carbonates* are detected in mineral waters by the tests already mentioned; and by the water, after being boiled, throwing down a precipitate on the addition of chloride of magnesium. The volatile nature of ammonia easily distinguishes it if present; and the best test for determining whether the fixed alkali be potassa or soda is chloride of platinum, which forms an immediate precipitate with potassa or any salt containing it, but is not at all affected by soda. The quantity of an alkali is determined by saturating it with sulphuric acid, and noting the quantity of real acid necessary; setting down, for every 100 grains of real acid used, 121·48 of potassa, or 78·32 of soda. The loss of weight produced by the effervescence on dropping in the acid, being added to the above, shows the quantity of an alkaline carbonate.

b. *Iodine* is detected by starch. Iodides by starch and chlorine.

c. *Earthy carbonates.* If the water contains sulphuretted hydrogen gas, this must be separated by exposing the water for a considerable time to the air, before the quantities of the earthy carbonates can be estimated. After this, boil the water for fifteen minutes, filter it when cold; and treat what remains on the filter with hydrochloric acid, which will dissolve the carbonates of lime, of magnesia, and of iron. The residuum, which may contain carbonate of alumina, and, perhaps, sulphate of lime, is to be dried in a red heat, and its weight noted; and then boiled in a solution of carbonate of soda. The soda is next to be saturated with hydrochloric acid, and the mixture boiled for half an hour, which precipitates carbonate of lime and alumina. This precipitate being dried, the lime is to be separated by acetic acid, and the alumina that remains dried and weighed; so that, by subtracting its weight from the original weight, the proportion of sulphate of lime is ascertained.

To estimate the contents of the hydrochloric solution, add to it ammonia as long as it throws down a reddish precipitate, which is the iron united with a portion of magnesia. Separate the magnesia by acetic acid, the precipitate being previously dried by exposure to the air, in a heat of 200°, and the solution added to the hydrochloric solution. To determine the weight of the iron, redissolve it in hydrochloric acid, then precipitate it by an alkaline carbonate, and dry, and weigh.

Sulphuric acid is now to be added to the hydrochloric solution; and the sulphate of lime, thus obtained, is to be heated to redness, and weighed; setting down for every 100 grains of it 74 of carbonate of lime. From the solution the magnesia is lastly to be separated by carbonate of soda, dried and weighed: then evaporate the remaining solution to dryness, and wash the residue with distilled water, so as to dissolve the chloride of sodium. This residue is carbonate of magnesia, the weight of which, when dried, must be added to the former; which gives the entire weight of the carbonate of magnesia.

3. MINERAL ACIDS exist in mineral water, sometimes uncombined, but generally combined with alkalies and earths, forming sulphates.

a. SULPHURIC ACID is readily detected by chloride of barium, when it does not exceed the millionth part of the water. To render this test certain, however, the chloride must be diluted; the alkaline carbonates, if the water contain any, must be previously saturated with hydrochloric acid; and the precipitate must be insoluble in hydrochloric acid. The hydrosulphurets are precipitated by chloride of barium, but their presence is easily detected by their odour.

The proportion of sulphuric acid is easily estimated by saturating it with barytic water, and heating the precipitate to ignition: every 100 grains of this sulphate of baryta indicate 34 of real sulphuric acid.

b. The *Sulphates* contained in mineral waters are six in number, and are incompatible with the following salts placed in the opposite column: —

Fixed alkaline sulphates -	Nitrates of lime and of magnesia. Chlorides of calcium and of magnesium.

Sulphate of lime - -	Alkalies. Carbonate of magnesia. Chloride of barium.
Alum - - - -	Alkalies. Chloride of barium. Nitrate of lime, carbonate of lime. Carbonate of magnesia.
Sulphate of magnesia -	Alkalies. Chloride of barium. Nitrate of lime, chloride of calcium.
Sulphate of iron - -	Alkalies. Chloride of barium. Earthy carbonates.

b. 1. *Sulphate of soda.* To detect this salt, first evaporate the water to one half, and add lime-water as long as any precipitate falls. This precipitates all the earths except sulphate of lime, which may be separated by evaporating the fluid till it becomes concentrated, then adding a little alcohol, and after filtration a little oxalic acid. If lime-water produces a precipitate in the water thus treated, immediately, or after a little alcohol be added, either sulphate of potassa or of soda is present. To determine which, add acetate of baryta, which will precipitate sulphate of baryta; then filter and evaporate the filtered fluid to dryness, and dissolve the residue by digesting it in alcohol, and evaporate to dryness. If the sulphate be sulphate of potassa, the dry salt thus obtained, being acetate of potassa, will deliquesce; but if it be sulphate of soda, the acetate will effloresce.

The proportion of the alkaline sulphates is found by precipitating their acid, by nitrate of baryta, from the purified water. If soda be the base of the salt contained in the water, for every 100 grains of this precipitate ignited set down 61·2 grains of dried sulphate of soda; if potassa be the base, for 100 grains of ignited precipitate set down 74·8 of dry sulphate of potassa.

b. 2. *Sulphate of lime* is detected by an immediate precipitate being formed by oxalate of potassa. To determine its quantity, first saturate any earthy carbonates that may be present with nitric acid; then evaporate the fluid to a few ounces; and having precipitated the sulphate of lime by means of proof spirit, dry and weigh it.

b. 3. *Alum* is detected by carbonate of magnesia, chloride of calcium, chloride of magnesium, or succinate of ammonia. Twelve grains of alumina precipitated by carbonate of magnesia, heated to incandescence, indicate 100 grains of crystallized alum, or 49 of the dried salt.

b. 4. *Sulphate of magnesia* may be detected in any water (previously freed from any alum or uncombined acids) by hydrosulphuret of strontian, which produces an immediate precipitate with this salt, and with no other. If no other earthy sulphate be present, the sulphuric acid may be separated by a barytic salt; every 100 grains of the ignited precipitate indicating 51 grains of dried sulphate of magnesia. If sulphate of iron be present, mix the water with a portion of argil, and expose it for some days to the air, during which time oxide of iron and sulphate of alumina are precipitated, leaving the sulphate of magnesia alone in solution; which may be then estimated by the above method. The Epsom spring in this country is the best example of this salt, as the chief agent in a mineral water.

b. 5. *Sulphate of iron* is detected by tincture of galls striking a black colour with the water after it has been boiled, and has cooled. Its quantity may be estimated by precipitating the iron by ferrocyanide of potassium.[1]

c. HYDROCHLORIC ACID, either uncombined or combined, is detected by nitrate of silver, which forms with it a white precipitate insoluble in nitric acid; but the alkaline carbonates, if any, must be first saturated by nitric acid, and any sulphuric acid removed by nitrate of baryta. The proportion of uncombined acid is ascertained by saturating it with barytic water, and then precipitating the baryta by sulphuric acid. For every 100 grains of the ignited precipitate set down 21 grains

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[1] To make the calculation, the weight of a precipitate produced by the prussiate in a solution of a given weight of sulphate of iron in water must be previously determined.

of real hydrochloric acid. Very minute portions of chlorides may be detected by putting into some pure nitric acid contained in a porcelain capsule a minute quantity of finely divided gold, precipitated from its solution by sulphate of iron, and then adding the supposed chloride. If it be a chloride, a light tint will be gradually formed round the gold.[1]

d. The *Chlorides* contained in mineral waters are incompatible with the following articles in the second column : —

Chloride of barium - -	Sulphates. Alkaline carbonates. Earthy carbonates.
Chloride of calcium - -	Sulphates, except of lime. Alkaline carbonates. Carbonate of magnesia.
Chloride of magnesium -	Fixed alkaline sulphates. Alkaline carbonates.

d. 1. *Chlorides of sodium and of potassium* are detected in water by acetate of silver: but any earthy nitrates and chlorides must first be decomposed by sulphuric acid, and the sulphates separated by alcohol and nitrate of baryta. To ascertain whether the salts be chloride of sodium or of potassium, evaporate to dryness, then dissolve the acetate in alcohol, and again evaporate to dryness. If it be acetate of potassa the salt will deliquesce; but if acetate of soda, it will effloresce. To estimate the quantity of these salts, if they be unaccompanied by other salts, it is only necessary to dry and weigh the precipitate obtained by nitrate of silver, setting down for every 100 grains of chloride of silver thus thrown down, 52 of chloride of potassium, and 41 of chloride of sodium. If alkaline carbonates be present, they must be first saturated with sulphuric acid, and sulphate of silver used to precipitate the hydrochloric acid. The county of Cheshire is rich in brine springs; a weaker one is at Ashby-de-la-Zouch in Leicestershire. The chloride of sodium is sometimes found in union with iodine, as at Salzhous in Hessia.

d. 2. *Chloride of barium* is detected by sulphuric acid. It is rarely found.

d. 3. *Chloride of calcium.* To detect this salt the water must be first freed from the sulphates, then filtered, evaporated to dryness, the dry mass treated with alcohol, and the residue, after evaporating the alcohol, dissolved in water. If this solution yield a precipitate with acetate of silver, the water contained chloride of calcium. The springs of Airthrey, Dumblane, and Pitcaithley, in Scotland, contain little besides this chloride, with a little chloride of sodium. The waters are purgative.

d. 4. *Chloride of magnesium* is detected by separating the sulphates, and proceeding as in the former case. If the aqueous solution of the dry mass treated with alcohol afford no precipitate with carbonate of lime; and if sulphuric acid and evaporation, with the addition of a little alcohol, occasion no precipitate, the solution contains only magnesian salt.

d. 5. *Chloride of aluminum* is detected by first saturating any alkali the water may contain with nitric acid, and separating any sulphuric acid by nitrate of baryta; and then adding carbonate of lime, which produces a precipitate if this salt be present. This process also precipitates chloride of iron and of manganese, if any be present. The chief aluminous chalybeates are those of the Isle of Wight, Beulah, near London, and Moffat in Dumfries-shire.

To estimate the quantities of these salts, which may all be contained in the same water, the earths, after separating any sulphates that may be present, are to be precipitated by baryta water, and redissolved in hydrochloric acid. They are then to be separated by the rules already mentioned, and separately weighed. For every 50 grains of lime set down 100 of dried chloride of calcium; for 30 grains of magnesia, 100 of chloride of magnesium; and for 21·8 grains of alumina, 100 of chloride of aluminum. The barium of the chloride of barium, which the addition of the baryta water had formed in the mineral water by precipitating the earths, is now to be separated by sulphuric acid, and its hydrochloric acid expelled by heat; after which the chloride of sodium, which the water originally contained, is to be obtained by evaporation.

e. NITRIC ACID never exists in an uncombined state in mineral waters, and even

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[1] *Ann. de Chim.* xxviii. 26.

the nitrates are comparatively of rare occurrence. The nitrates may be detected by an experiment, the inverse of that employed for detecting the chlorides; that is, by putting the fragment of gold into pure, colourless hydrochloric acid, and adding to it the suspected nitrate.

f. The *Nitrates* are incompatible with the salts in the second column of the following table: —

Nitrate of lime - - -	Alkaline carbonates. Sulphates, except of lime. Carbonates of magnesia and alumina.
Nitrate of magnesia - -	Fixed alkaline sulphates.

f. 1. *Nitrate of potassa* may occur in mineral waters in conjunction with sulphates and chlorides; the former of which must be decomposed by acetate of baryta, and the latter by acetate of silver, before the nitrates can be estimated. After these previous steps, filter the water, evaporate it to dryness, and treat with alcohol; which dissolves the acetates, and leaves the nitre.

f. 2. *Nitrate of lime* is detected by first concentrating the water, and separating the sulphates by alcohol; then filtering and distilling off the alcohol, and separating any hydrochloric acid by acetate of silver; afterwards filtering again, evaporating to dryness, and dissolving the residue in alcohol, which must be also distilled off, and the dried residue dissolved in water. If oxalic acid detect lime in this solution, the mineral water contains nitrate of lime; the quantity of which may be estimated by precipitating with sulphuric acid, and calculating the quantity of lime contained in the sulphate; and for every 35 grains of lime setting down 100 grains of dry nitrate of lime.

f. 3. *Nitrate of magnesia* is detected by nearly the same means: but to the last watery solution, instead of oxalic acid, add potassa, as long as any precipitate appears. Filter this solution; evaporate and treat the dry mass with alcohol. If a residue of nitre remains, the mineral water contained nitrate of magnesia.

Such is the general method of ascertaining the components of mineral waters, and the proportion of the ingredients contained in any particular water. To render the analysis complete, many minutiæ must necessarily be attended to; but the detail of these would far exceed the limits which a work of this kind admits of.

No. II.

ELECTRICITY.

CERTAIN substances, especially amber and glass, when rubbed briskly with silk or woollen stuff, acquire the property of attracting light bodies in their vicinity, such as pieces of paper and feathers, and this effect is due to the development of a power which has been called electricity, from its having been first noticed in amber, known to the Greeks by the name of ηλεκτρον. Bodies in their relation to electricity are divided into two classes, the one named *conductors*, which possess the property of transmitting this power, which are also called *non-electrics*, from not being capable of electric excitation, or probably from not allowing accumulation, and the other class called *non-conductors* from not transmitting electricity, and likewise called *electrics* from their being readily excited by friction. In the first class are found all the metals, plumbago, charcoal, and many liquids; most other substances are non-conductors. Various circumstances modify this property, as heat and moisture.

For the better showing this phenomena of frictional electricity, different forms of apparatus have been constructed, named electrical machines, the object of which is to accumulate the fluid. The two most common forms used for medical purposes are the cylinder and plate machines. In the first, the excitation is produced by the revolution of a cylinder of glass against what is termed a rubber or cushion; in the second, a circle of plate glass is substituted for the cylinder; connected with the exciting portion of the apparatus is another part named the conductor, consisting of a metallic cylinder supported on legs of glass or some other non-conductor, which is brought into close contiguity with the excitor by means of a forked or pointed appendage. The rubber, which is usually insulated, must, when the machine is in action, be connected with the

earth by means of some conductor, as a metallic chain. When, by means of the revolution of the glass, the equilibrium of the electric fluid in the rubber is disturbed, it is drawn off by the pointed extremities of the conductor, and (glass being the electric employed) the conductor becomes positively, the rubber negatively, excited : this last, however, being connected with the earth by a conducting medium, its state of equilibrium is constantly restored, and if the revolution is continued a large amount of fluid may be accumulated in the conductor.

When highly charged, the presentation of a piece of metal or any other body, as the knuckle of an individual, will cause the discharge of vivid sparks, accompanied with a crackling noise. Any object or person may be made part of the conductor, and exhibit all its phenomena, by being insulated by a non-conductor at the same time that it is connected with it. A form of apparatus for thus insulating patients is named the electric stool or chair, which may be readily formed by having a stool with glass legs, or a chair, the legs of which have knobs of glass placed under them. If a body previously insulated is placed near the excited conductor, it will be found that its state of electric equilibrium will be disturbed. The part farthest from the conductor will be in a condition similar, and that nearest will be in an opposite condition to the conductor. On this principle an apparatus for accumulating a large amount of electricity, named the Leyden jar, is constructed, consisting of a glass jar or bottle, lined within and without with some metallic coating, as tin foil, and in connection with the coating inside is a metallic rod, rising above the neck of the bottle and terminating in a button of the same material ; a considerable amount of electric fluid may be accumulated by this arrangement. The mode of its action is as follows : — When brought into contact with the conductor, the internal coating is rendered say positively excited, at the same time that the external coating, which it is essential to connect with the earth, becomes in an opposite condition, a state not manifested unless the jar be insulated. By this means a large accumulation of electricity, or an intensity of induction, may be obtained. When a communication is made between the outer and inner coats of this jar, by means of a bent metallic rod, the equilibrium of the two surfaces is suddenly restored, accompanied with a flash of light and a loud report: should any part of the body be interposed in the circuit, a peculiar sensation, called the electric shock, is felt. A number of these jars may be combined, the internal and external surfaces being respectively connected, and the combination thus produced, which is capable of being simultaneously charged and discharged, is called the electric battery.

Electricity may also be excited by chemical action : thus, if two metals are placed in a fluid which possesses the power of acting on them unequally, or upon one only, the state of equilibrium is disturbed, one becoming positive, the other negative : this phenomena may be shown by immersing zinc and platinum in dilute sulphuric acid ; if the two are connected by a metallic wire, discharge takes place, or equilibrium is restored, which occurs as often as the circle is completed. In these cases the metal which is most acted on becomes negatively excited ; several alternations of these plates may be connected together, and the intensity of the current thus exalted. These combinations may be in the form of the electric pile, invented by Volta, or of its modified form, Cruikshank's galvanic battery. The number and size of the component plates of which may be modified according as quantity or intensity of electricity is required. If an insulated metallic wire is wound round a bar of soft iron, and a current of electricity passed through it, the iron assumes a magnetic condition, and remains so as long as the current continues. And inversely, when soft iron is rendered magnetic by proximity to the two poles of a permanent magnet or otherwise, an electric current is induced in a surrounding coil ; and the same takes place, but in an opposite direction, when the soft iron ceases to be magnetic from the removal of the permanent magnet. Again, if two insulated coils are arranged, so that one encircles the other, and a current of electricity sent through one coil, it will be found that a current in the opposite direction will be induced in the second coil ; and, again, a current in the same direction in the second coil, at the instant the current in the first is suspended. In this case the current in the first coil is named the *direct* or *primary ;* those in the second *induced* or *secondary* currents.

On these principles are constructed several forms of instruments for procuring electricity in different states of tension or quantity. In the secondary current, the tension has relation to the length, the quantity to the size of the component wire. Some of these instruments are named *electro-magnetic*, others *magneto-electric*, according as the power originates with the voltaic current or the permanent magnet.

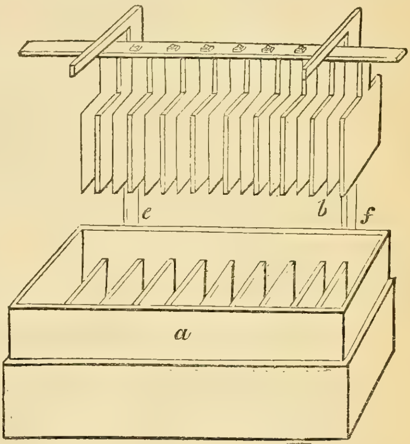
The apparatus usually employed for medical purposes, the power of which depends

on the direct voltaic current, or on secondary or induced currents, derived from the primary current, or from induced magnetism, are —

1. The single voltaic combination.
2. The voltaic battery.
3. The coil machine, or electro-magnetic apparatus.
4. The magneto-electric machine.

1. *The single pair* consists simply of a plate of a readily oxidizable metal, combined with one much less so. For which purpose, zinc and silver plates are most usually employed.

2. *The voltaic or galvanic battery.*—Many forms of this apparatus have been devised: that which is commonly employed is termed Cruikshank's battery, or trough, which consists of a wooden trough into which are cemented about fifty pairs of copper and zinc plates sodered together, the size of the plates ranging from two to four inches square, and the internal between them very small, the same order with regard to the metallic elements being preserved throughout. The battery is set in action by means of some dilute acid, as sulphuric or hydrochloric, or even a solution of common salt. Sometimes an improved apparatus is employed, consisting of a trough of earthenware, *a*, divided in its length by numerous partitions of the same material. Into each of the cells thus formed, and filled with the diluted acid, a plate of zinc and a plate of copper, *b*, *e*, are placed near one another, but not so as to touch, and a communication is made, by a metallic arc, between the zinc in one cell and the copper in the next. The whole of these plates are attached to a wooden bar, so that they can be removed at the pleasure of the operator, and supported on hooks fixed in the cross bars of the props *e*, *f*, attached to the side of the trough.



Or, again, the pile of Volta, consisting of plates of zinc and copper or silver, and pieces of moistened woollen cloth (piled in order of silver, zinc, cloth), for twenty or more repetitions.

The intensity of the current in these apparatus depends on the number of these alternations, the quantity on the size of the plates. When large quantities of electricity are required for medical purposes, other forms of batteries, as Smee's, Daniell's, or Grove's battery may be used, descriptions of which will be found in works more especially devoted to the subject.

3. *The coil or electro-magnetic machine.* — Many forms of this apparatus have been invented. They consist essentially of α one or two voltaic combinations, for the purpose of producing the primary current: β, a coil of stout wire of from thirty to eighty feet in length, which is insulated by a covering of silk; γ, a second coil, wound round the first, and consisting of from 200 to 1000 feet of a very fine wire, also insulated, forming what is termed the secondary coil: these coils are usually wound round a wooden reel, the wires, proceeding from the two electrodes or poles, are connected with two ends of the primary coil; and attached to the extremities of the secondary coil are other two wires with insulating handles attached for the purpose of applying the current to different parts of the body. As it is necessary that the current through the primary coil should be alternately interrupted and completed, a contrivance has been introduced to effect this, sometimes consisting of a cog-wheel or ratchet, but now more commonly of an automatic apparatus, composed of a short helix of wire, part of the primary coil, surrounding a small horse-shoe of soft iron, and a thin vibrating brass arm, and platina pointed wire, so arranged that when the circuit of the primary current is complete it is again broken, from the attraction of the magnet then formed, for a piece of iron fixed to the vibrating arm; and by this means contact can be established and broken very rapidly. A bar of soft iron, or a bundle of insulated soft iron wires, is introduced into the centre

of the reel, which very much increases the intensity of the secondary currents. It will be seen from the construction of this apparatus, that the secondary currents will be alternately in opposite directions, and, as it has been thought by some that this is prejudicial in the application of electricity to medicine, a machine has been invented by Dr. G. Bird, in which only one of the currents is made use of.

4. In *the magneto-electric machine* a large permanent horse-shoe magnet is employed in place of the voltaic battery and primary coil, and an armature of soft iron surrounded by a coil of very thin insulated wire is caused to revolve close to the poles of the magnet; by which means magnetism is alternately induced and destroyed; and, coincident with this formation and destruction, electrical currents are given off in opposite directions, and, by a little mechanical contrivance, can be collected and applied to any part of the body. The intensity or quantity of electricity has relation to the length and size of the wire.

By means of the single pair of plates, a very feeble current of electricity is obtained, which is incapable of being felt as a shock, and is only made apparent when passed through a nerve of special sensation. If, however, the zinc plate be applied to a blistered surface, then an ulcerative action on the skin may be kept up by the constant formation of chloride of zinc at the surface, arising from the decomposition of the chlorides in the animal fluids, and thus what has been named an electrical moxa may be produced.

By the use of the battery or combination we obtain phenomena differing in proportion to the number of pairs employed, and to their extent of surface. When the combinations are numerous, the plates being small, and the current allowed to pass through a part of the body, the sensation of the electric shock is produced. If made to pass through certain fluids, as water, solution of salts, &c., they are decomposed; in the case of water, oxygen is eliminated at one extremity, hydrogen at the other; and when metallic salts are made use of, the metals become reduced and are deposited.

If the plates comprising the battery are large, and a wire interposed, this becomes heated, or even melted; and should it be an oxidizable metal dissipated in the form of oxide. The phenomena produced by the magneto-electric and electro-magnetic machines resemble in many respects those derived from the voltaic battery, exhibiting the phenomena of intensity or quantity according to the nature of the secondary coil: they differ, however, in this respect, that whereas in the battery the current is always in one direction, in the secondary current they alternate. And that such is the case is readily ascertained by placing between the extremities of the conducting wires a piece of starch paper moistened with a solution of iodide of potassium, the iodine is liberated, and acting on the starch forms a blue compound (iodide of amydin), and this takes place at one point of the wire only, when the current is only in one direction, but at both points when the currents alternate.

Medical Properties and Uses.—In the application of electricity to medicine, we may make use either of static or frictional electricity, or dynamic or current electricity. Static electricity may be used in the following ways: — the patient may be insulated by means of the stool or chair, and thus made part of the prime conductor, and is then said to be placed in the electric bath, which may be rendered either positive or negative. Many, and sometimes wonderful, effects are stated to have been occasionally produced under these circumstances, the symptoms in the positive bath being those of excitement, such as quickening of the pulse, perspiration; those in the negative, depression: but many conflicting statements have been made concerning these symptoms, most of them are probably due to mental influences, and, as a medical agent, the electric bath is now seldom employed. Again, from patients thus insulated sparks may be drawn from any part of the body, or sparks may be given to any part of the patient from the prime conductor. The symptoms then produced are more or less irritating according to the intensity of the excitation, and after a short time the skin of the part under operations becomes red, from the production of erythema, and, if this is continued, even small vesicles may be produced. Electricity thus administered appears to be confined in its effects to the surface of the body, and the internal organs are but little, if at all, affected, it is probably little more than simple counter-irritation, and may thus be sometimes useful to allay deep-seated or hysterical pains.

If we employ the Leyden jar, and cause the discharge to take place through the body or through any parts of the body, then the sensation of a shock is produced, and the action is not confined to the surface; the muscles through which the current passes are thrown into a state of contraction; and if it passes through a large nerve, a sensation in the direction of that nerve is produced, followed, if the shock be strong, by a feeling of numbness. These currents produced by the successive discharges of the

Leyden jar may be employed in the same cases as those obtained either from the voltaic battery or from the coil machines. The character of the electricity differs from these last by being greater in intensity, but smaller in quantity; the size of the Leyden jar or battery determining the quantity, the amount of the induction, the intensity of the electricity. If we employ the voltaic battery, or the coil currents, we then have the same sensation of shock, the contraction of muscles, &c., as in the last case. If transmitted along nerves, then it produces effects dependent on their function: thus, if a nerve of motion, contractions of the muscles supplied by that nerve are produced; if along a nerve of common sensation, then pain ensues; and if the nerves of special sensations are acted on, then phenomena of light, sound, taste, smell, are produced, according to the normal function of the nerve.

When the central part of the nervous system, as the brain or spine, are made part of a very powerful electric current, instantaneous death, or effects of concussion of those parts, may be produced. It has been supposed that the action of the liver and secreting organs may be influenced by the passage of the electric current. The direction of the current along a nerve has been supposed by some to influence the effects, and hence many have objected to the use of apparatus producing alternating currents.

The diseases in which these forms of electricity are most frequently employed, are those in which some portion of the nervous system is affected, and more particularly when such is of a local character. Thus, it has been used with considerable success in local paralysis depending on the action of lead, for example wrist drop, paralysis of the portio dura depending on local causes, in nervous amaurosis, in nervous deafness, in aphonia; also in certain forms of neuralgia, spasmodic asthma, and the various nervous affections depending on an hysterical condition of the habit; it has been used also in chorea, and in tetanus; in the former disease frequently with benefit. Occasionally, also, the electric current has been employed in increasing secretions, especially when their deficiency depends on atonic condition of the habit, as in amenorrhœa. It has also been occasionally employed for the dispersion of tumours of a chronic character.

In general, the application of electricity to patients suffering from diseases of the nervous centres, accompanied with paraplegia or hemiplegia, is attended with no good results; and in some cases, especially when the disease is recent, and inflammatory symptoms are present, evil consequences have ensued from the use of this agent. As electricity produces a powerful exciting effect upon the nervous system it may be advantageously employed in cases of narcotic poisoning, as by opium; and if the coil machine is used, the effect may be kept up for many hours, until the narcotic symptoms have passed off. In asphyxia, from drowning or any other cause, the influence of the electric shock, passed through the heart and diaphragm, often proves a powerful means of restoring animation. Very recently, Mr. Marshall, of University College Hospital, has employed the voltaic battery in place of the knife: by means of a wire thus heated, he destroys and removes parts, and causes by its action the healing of others, as of fistulous openings. Many cases of fistula in ano, hæmorrhoids, &c., have thus been treated by him with great success. He employs a powerful battery, constructed so as to produce great heating powers in a small compass, and uses wires of platinum, as this metal is not only unacted upon by the fluids of the parts, but also is readily brought to a sufficient degree of heat on account of its being an imperfect electric conductor.

Our limits will not allow us to enlarge more upon the phenomena and modes of employing this agent: for such information we refer our readers to the many works upon natural philosophy and therapeutics.

No. III.

ON THE ART OF PRESCRIBING MEDICINES.

INDEPENDENT of the knowledge of diseases and the treatment of them, much of the success of the practitioner depends on circumstances connected altogether with the form in which the remedies are exhibited. In prescribing a medicine, even the best calculated to fulfil the object of the practitioner, it is necessary to consider the age, sex, temperament, habits, and idiosyncrasy of the patient, before the dose can be properly apportioned; and, as far as the medicine itself is regarded, the most convenient and agreeable form of exhibiting it; whether it should be given alone, or combined with other ingre-

dients, and how far these are likely to impede, modify, or facilitate its operation. An attention to these circumstances is absolutely requisite to prevent the errors which too frequently occur in forming a prescription.

1. *Circumstances connected with the State of the Patient. Age.* — Here it must be observed, that the doses of the medicines described in the foregoing pages are those adapted for an adult; but, as in the two extremes of life, childhood and old age, the body is weaker, and in early youth more susceptible of all impressions, these quantities cannot be administered with safety in every case, the judgment of the prescriber must, therefore, be exercised. Under ordinary circumstances the following table, originally drawn up by Gaubius, may be considered as a sufficient guide for the young practitioner: —

Ages.	Proportional Quantities.		Doses.
For an adult	Suppose the dose to be - -	ONE	or 1 drachm.
Under 1 year	Will require only - - - -	$\frac{1}{12}$	— *5* grains.
2 years	———————	$\frac{1}{8}$	— $7\frac{1}{2}$ grains.
3 ——	———————	$\frac{1}{6}$	— 10 grains.
4 ——	———————	$\frac{1}{4}$	— 15 grains.
7 ——	———————	$\frac{1}{3}$	— 1 scruple.
14 ——	———————	$\frac{1}{2}$	— $\frac{1}{2}$ drachm.
20 ——	———————	$\frac{2}{3}$	— 2 scruples.
Above 21 ——	The full dose - - - - -		— 1 drachm.
65 ——	The inverse gradation of the above.		

Sex. — Although some women possess as much bodily strength and vigour of constitution as the majority of men, yet the general greater delicacy and sensibility of the female frame, at every period of life, require not only caution in apportioning the doses of active medicines, which should be less than those ordered for men of the same age; but the medicines themselves should be such as are likely to fulfil the indications required, without much violence. The state of the uterine system likewise must not be overlooked in prescribing for a female. Thus the employment of aloetic and drastic purgatives, cinchona bark, sulphuric acid, astringents, chalybeates, and iodides, should be suspended during the period of the catamenia.

Temperament.—It is undoubtedly true, that persons of different temperaments or original conformations of body are differently affected by the operation of medicines. Stimulants more readily affect those of a *sanguine* than those of a *phlegmatic* temperament; and, therefore, smaller doses are required. In the phlegmatic, also, the bowels are generally torpid, and require a description of purgatives and such doses of them to excite the proper peristaltic motion as would induce either visceral inflammation or be followed by an alarming state of debility, were they administered to those of a sanguine temperament. Hence the necessity of attending to this circumstance in prescribing.

Habits — have a considerable influence in modifying the operation of medicines. Persons addicted to the use of spirits, narcotics, and other stimulants, are less easily excited both by medical stimulants and narcotics; and the knowledge of the habits of a patient, as far as the exhibition of purgatives is concerned, is absolutely necessary for the prescriber, many people being in the almost daily habit of taking this class of remedies without consulting a medical practitioner. In the first of these cases, larger doses of stimulants and narcotics are required to produce the ordinary effects of these remedies; but in the second a change of the purgative usually taken will generally be sufficient. It should, however, be recollected that in prescribing a narcotic, which has not been taken by the patient, the dose must not be larger than usual. In the employment of medicines, also, which require to be long continued, the beneficial effect is soon lost if the doses be not increased.

Idiosyncrasy.—Many persons have a peculiarity of disposition, unconnected with temperament, which renders them liable to be affected by substances taken into the stomach, either in the form of food or of medicine, in a manner different from the majority of mankind. Such a state can be discovered only by accident or by time; but

when it is known, it should be attended to by the practitioner. Instances in which opium proves deleterious in every form and dose are not unfrequent. I knew a lady, in whom the smallest dose of squill excited an erythematic eruption over the whole body; spirit of turpentine and copaiva, also, frequently produce a similar eruption; and many examples of the same kind might be quoted. But besides these guides in forming a prescription, the choice of the medicine must occasionally depend on the circumstance of the patient being more or less immediately under the eye of the prescriber. Thus, if the patient can be seen every day, or frequently, by the practitioner, the most active medicine which the nature of the case requires should be chosen; but if he cannot be frequently seen, or is not resident in the same place, the practitioner should choose a remedy of the same class, but less likely to have a sudden or a violent effect. Thus, in prescribing for ascites under such circumstances, squill or acetate of potassa, or bitartrate of potassa, should be preferred to elaterium; for intermittent fever, cinchona bark to the arsenical solution; and so in other cases, when the patient is not under the eye of the prescriber.

2. *Of the Form and Composition of extemporaneous Prescriptions.* — In every prescription simplicity should be kept in view, and when one medicine will answer the intention of the prescriber, it ought to be preferred. The nauseous taste, however, and the other qualities of the great majority of drugs, require the addition of others to modify their action; but, although medicines are more generally prescribed in a compound form, yet the practice of accumulating a great variety of ingredients in one prescription must be avoided.

Medicines exhibited in the fluid form operate sooner, and with more certainty than in the solid state; but in choosing the vehicle or solvent, the taste of the patient ought not to be overlooked. Thus, for those to whom peppermint-water is not disagreeable, the nauseous taste of sulphate of magnesia is more completely concealed by that vehicle than any other; if cinchona bark in powder be ordered, milk effectually covers its taste, provided the dose be taken the moment it is mixed; and if aloes, the most nauseous article of the materia medica, be prescribed in a fluid form, a solution of extract of liquorice renders it by no means unpalatable. Medicines which, when given alone, produce griping, require the addition of aromatics to correct that quality; and when they operate with violence, mucilages and demulcents are sometimes necessary to obtund their acrimony, or narcotics to moderate their action. In prescribing purgatives it is also necessary to consider the particular part of the alimentary canal on which they more immediately act. Thus sulphate of magnesia, sulphate of potassa, and rhubarb act chiefly on the duodenum, aloes on the rectum, calomel and jalap on the larger intestines, and tartrate of potassa on the entire length of the canal. Another reason for ordering medicines in a compound form is the necessity of producing two or more effects at one time. Thus the same dose may be required, in a case of colic, for example, to allay pain and to open the bowels; or, in fever, to determine to the surface, to allay irritation, and to produce sleep. But in combining medicines, care must be taken not to bring together incompatibles, or substances that decompose each other, or chemically combine, and, consequently, alter the nature of the mixture, or render it inert; unless the resulting compound be the remedy on which the practitioner relies. Thus, acids and alkalies are incompatible, unless the neutral salt they produce be the remedy required; and astringent vegetable infusions and decoctions destroy the emetic and diaphoretic property of tartar emetic. Hence the necessity of a knowledge of chemistry to the medical practitioner.

In writing a prescription, the first object is the principal or most active ingredient, which is called the *basis;* the next, the *adjuvans*, or that which is designed to promote the action of the basis; the third, the *corrigens*, or that intended to correct or modify its action; and the last, the *vehiculum*, or that substance in which the more active ingredients are to be exhibited, and which, consequently, gives the formula its peculiar character. It has been usually regarded as a proper rule in writing a prescription to place the basis first, and the other articles in the form in which they have been enumerated; but this must depend on the mode best fitted for compounding the medicine. Thus, salts and other soluble solids should be placed before the menstruum in which they are to be dissolved; and volatile substances should always be placed last, as they are necessarily the last ingredients added in the manipulation of the compound. Finally, the names of each ingredient should be written at full length, in a legible hand, and the symbols of the quantities distinctly marked; and no prescription should pass from the hand of the prescriber without being deliberately read over, and its correctness ascertained.

To facilitate the art of prescribing to the young practitioner, I have added a Table of Incompatibles, and a few examples of the usual Forms of extemporaneous Prescriptions.

No. IV.

TABLE OF INCOMPATIBLES.

Substances.	*Incompatible with*
Acidum Citricum, when required to operate as an acid - -	Alkalies. Alkaline Solutions. ——— Sulphates. ——— Carbonates. ——— Tartrates. Soaps. Earthy Carbonates. Acetates. Metallic Carbonates.
——— Hydrochloricum - -	Alkalies. Tartrate of Potassa. Sulphuret of Potassium. Most Earths. —— Oxides. —— Carbonates of the incompatible Oxides. Potassio-tartrate of Antimony. Potassio-tartrate of Iron. Nitrate of Silver. Solutions of Acetate and Diacetate of Lead.
——— Nitricum - - -	Alkalies. Carbonates of Alkalies. Acetates of Alkalies. Earths. Oxides. Sulphate of Iron. Solutions of Acetates of Lead. Sulphurets. Cyanides. Iodides. Bromides. Charcoal. Phosphorus. Sugar. Alcohol and Spirits. Volatile Oils.
——— Sulphuricum - -	Alkalies. Alkaline Carbonates. Some Earths. —— Earthy Carbonates. Solution of Chloride of Calcium. Barytic Salts. Oxides of Metals. Solutions of Acetates of Lead. Potassio-tartrate of Iron.

Substances.	*Incompatible with*
Acidum Tartaricum	Alkalies. Carbonates of Alkalies. Salts of Potassa. Most Earths. —— Carbonates of Earths. Salts of Lime. ——— Lead.
Ammoniæ Liquor	All Acids. Saline Solutions of Earths, except Baryta and Lime.
——— Sesquicarbonas and Carbonas	Acids. Potassa. Soda. Carbonate of Soda. ——— Potassa. Bisulphate of Potassa. Bitartrate of Potassa. Lime. —— water. Solution of Chloride of Calcium. Magnesia. Sulphate of Magnesia. Alum. Salts of Iron, except Potassio-tartrate of Iron. Sulphate of Zinc. Bichloride of Mercury. Acetate of Lead. Diacetate of Lead.
——— Acetatis Liquor	Acids. Potassa. Soda. Carbonate of Potassa. ——— Soda. Lime-water. Magnesia. Sulphate of Magnesia. Bichloride of Mercury. Sulphate of Iron. ——— Copper. ——— Zinc. Nitrate of Silver. Acetate of Lead. Diacetate of Lead.
Piperina	Carbonates of Alkalies. Ferrocyanide of Potassium. Aqueous Solutions.
Potassæ Carbonas	Acids. Acidulous Salts. Hydrochlorate of Ammonia. Acetate of Ammonia. Lime-water. Chloride of Calcium. Sulphate of Magnesia. Disulphate of Quina. Alum. Potassio-tartrate of Antimony. Nitrate of Silver. Ammoniated Copper. ——— Iron. Tincture of Ammoniated Iron.

Substances.	*Incompatible with*
Potassæ Carbonas - -	Tincture of Sesquichloride of Iron. Sulphate of Zinc. Calomel. Bichloride of Mercury. Acetate of Lead. Diacetate of Lead. Iodide of Iron. ——— Zinc. ——— Arsenic.
——— Carbonatis Liquor - -	The same as with Potassæ Carbonas.
——— Bicarbonas . - -	Nearly the same as with Potassæ Carbonas, except Bichloride of Mercury. Sulphate of Magnesia. Disulphate of Quina. Calomel, unless heated.
——— Liquor - - - -	Acids. Acidulous Salts. Carbonate of Ammonia. Acetate of Ammonia. Hydrochlorate of Ammonia. Preparations of Earths and of Oxides of Metals held in Solution by Acids, as Salts. Calomel. Bichloride of Mercury.
——— Acetas.	Sulphuric Acid. Hydrochloric Acid. Nitric Acid. Sulphate of Soda. ——— Magnesia. Most Metallic Salts. —— Earthy Salts.
——— Tartras - - -	Most Acids. —— Acidulous Salts. Lime-water. Chloride of Calcium. Salts of Lead. ——— Silver.
——— Bisulphas - - -	Alkalies. Earths. Carbonates of Earths. Oxides.
——— Sulphas - - -	Tartaric Acid. Baryta Water. Chloride of Barium. ——— Calcium. Acetate of Lead. Diacetate of Lead.
Quinæ Disulphas - - -	Chloride of Barium. ——— Calcium. Tincture of Galls. Acetate of Lead. Diacetate of Lead.
Sodæ Carbonas - - -	Acids. Acidulous Salts. Hydrochlorate of Ammonia. Earthy and Metallic Salts. Lime-water.
—— Bicarbonas - - -	The same as those of Sodæ Carbonas.

Substances.	*Incompatible with*
Sodæ Sulphas	Carbonate of Potassa. Solution of Baryta. Barytic Salts. Chloride of Calcium. Nitrate of Silver. Acetate of Lead. Diacetate of Lead.
—— Potassio-tartras	Most Acids. —— Acidulous Salts, except Bitartrate of Potassa. Barytic Salts. Salts of Lime. Acetate of Lead. Diacetate of Lead.
Alum	Alkalies. Carbonates of Alkalies. Tartrate of Potassa. Lime. Carbonate of Lime. Chloride of Barium. Magnesia. Carbonate of Magnesia. Acetates of Lead.
Barii Chloridum	Sulphates. Alkaline Carbonates. Earthy Carbonates.
Creta Preparata	Acids. Acidulous Salts. Preparations of Ipecacuanha, and Opium.
Calcis Liquor	Acids. Acidulous Salts. Alkaline Carbonates. Ammoniacal Salts. Borates. Metallic Salts. Astringent Vegetable Infusions.
Calcii Chloridum	Sulphuric Acid. Sulphates, except of Lime. Potassa. Soda. Carbonate of Potassa. ———— Soda. ———— Ammonia. ———— Magnesia.
Magnesiæ Sulphas	Potassa. Soda. Ammonia. Carbonate of Potassa. ———— Soda. Lime-water. Chloride of Calcium. Acetate of Lead.
———— Carbonas	Acids. Acidulous Salts. Hydrochlorate of Ammonia. Lime-water. Metallic Salts.
Magnesia	Same as with Magnesiæ Carbonas, except Lime-water.

Substances.	*Incompatible with*
Antimonii Potassio-tartras	Its solution is incompatible with Alkalies. Alkaline Carbonates. Some Earths. Lime-water. Chloride of Calcium. Some Oxides of Metals. Acetates of Lead. Infusions of Cinchona. ——— Rhubarb. ——— Catechu.
Argenti Nitras	Spring Water. River Water. Potassa. Soda. Carbonate of Potassa. ——— Soda. Hydrochlorate of Ammonia. Soaps. Lime-water. Sulphuric Acid, Hydrochloric Acid, Tartaric Acid, and Salts containing these Acids. Carbonate of Ammonia. Liquor Potassæ Arsenitis. Sulphuretted Hydrogen. Hydrosulphurets. Astringent Vegetable Infusions. Decoction of Yellow Cinchona Bark.
Liquor Potassæ Arsenitis	Acids. Acidulous Salts. Lime-water. Chloride of Calcium. Sulphate of Magnesia. Alum. Sulphate of Iron. Chloride of Iron. Iodide of Iron. Nitrate of Silver. Sulphate of Copper. Sulphuretted Hydrogen and its Compounds. Decoction of Cinchona.
Cupri Ammonia-sulphas	Acids. Potassa. Soda. Arsenious Acid. Lime-water.
Ferri Sulphas	Potassa. Soda. Ammonia. Carbonate of Potassa. ——— Soda. Baryta. Chloride of Barium. Salts of Baryta. Lime-water. Chloride of Calcium. Soaps. Nitrate of Silver. Acetates of Lead. Astringent Vegetable Infusions and Decoctions.

Substances.	*ncompatible with*
Ferri Sesquioxydum	Acids. Acidulous Salts.
—— Sesquichloridi Tinctura	Alkalies. Carbonates of Alkalies. Lime-water. Carbonate of Lime. Magnesia. Carbonate of Magnesia. Astringent Vegetable Decoctions. Solution of Gum Arabic.
—— Ammonio-chloridum	Alkalies. Alkaline Carbonates. Lime-water. Astringent Vegetable Decoctions.
—— Vinum	The same as with Ferri Sesquichloridi Tinctura.
Hydrargyrum cum Creta	Acids. Acidulous Salts.
Hydrargyri Binoxydum	Acids. Acidulous Salts. Sulphuretted Hydrogen.
———— Bichloridum	Potassa. Soda. Ammonia. Carbonate of Potassa. ———— Soda. ———— Ammonia. Sulphuret of Potassium. All Hydrosulphurets. Soap. Lime-water. Potassio-tartrate of Antimony. Nitrate of Silver. Acetates of Lead. Astringent Infusions or Decoctions.
———— Chloridum	Potassa. Soda. Ammonia. Alkaline Carbonates. Hydrosulphurets. Lime-water. Salts of Iron. ——— Lead. ——— Copper.
Plumbi Acetas	Sulphuric Acid. Hydrochloric Acid. Carbonic Acid. Citric Acid. Tartaric Acid. Potassa. Soda. Ammonia. Chloride of Sodium. Liquor Ammoniæ Acetatis. Lime-water. Carbonate of Lime. Sulphate of Lime. Solution of Sulphuretted Hydrogen. Hard Water. Astringent Infusions. Strychnia.

Substances.	*Incompatible with*
Plumbi Diacetatis Liquor	Same as with Plumbi Acetas.
Zinci Sulphas	Gum in solution. Alkalies. Alkaline Carbonates. Lime-water. Hydrosulphurets. Astringent Infusions and Decoctions.
—— Oxydum	Acids. Acidulous Salts. Alkalies.
Potassii Sulphuretum	Acids which combine with Potassa and expel Sulphuretted Hydrogen Gas. Solutions of most of the Metals.
Infusum Anthemidis	Salts of Iron. —— Mercury. —— Silver. —— Lead.
—— Armoraciæ Comp.	Alkaline Carbonates. Salts of Silver. —— Mercury.
—— Calumbæ	Lime-water. Acetates of Lead. Bichloride of Mercury.
—— Caryophyllorum	Lime-water. Solutions of the Preparations of Iron. —— Zinc. —— Lead. —— Silver. —— Antimony.
—— Cascarillæ	The same as with Infusum Caryophyllorum.
—— Cuspariæ	Solutions of the Salts of most Metals.
—— Digitalis	—— Iron. Probably by those of most other Metals.
—— Gentianæ Comp.	Solution of Acetate of Lead. —— Persulphate of Iron.
—— Lini Compositum	Preparations of Lead. —— Iron. Most Metallic Salts.
—— Rhei	The stronger Acids. Metallic Solutions. Some Astringent Infusions.
—— Rosæ Compositum	Alkalies. Earths and all substances which combine with Sulphuric Acid, or are acted upon by small quantities of it: Acetate of Lead. Sulphate of Iron.
—— Sennæ Compositum	Strong Acids. Lime-water. Most Metallic Salts.
—— Simarubæ	Alkaline Carbonates. Lime-water. Salts of Lead. —— Silver. —— Mercury.
Decoctum Aloes Compositum	Acids. Acidulous Salts. Earthy Salts. Metallic Salts. All substances which are decomposed by, or which decompose Carbonate of Potassa.

Substances.	*Incompatible with*
Decoctum Cydoniæ	Acids. Alcohol. Most Metallic Solutions.
——— Quercûs	Alkaline Solutions. Most Metallic Salts. Solutions of Isinglass. Decoction of Yellow Bark.
——— Sarzæ	Lime-water. Acetate of Lead.
Mistura Ferri Composita	Acids, Acidulous Salts } which dissolve the Proto-carbonate of Iron. Vegetable Astringents.
Spiritus Ammoniæ Aromaticus	Acids. Acidulous Salts. Earthy Salts. Lime-water. Metallic Salts.
——— Fœtidus	The same as Sp. Ammoniæ Aromaticus.
——— Succinatus	Acids. Acidulous Salts. Earthy —— Metallic ——
——— Camphoræ	Water.
Tinctura Opii	Potassa and its Carbonate. Soda ——— Ammonia ——— Most Metallic Salts. Infusion of Galls, and all Astringents.

No. V.

EXAMPLES OF A FEW OF THE MOST USUAL FORMS OF EXTEMPORANEOUS PRESCRIPTIONS.*

Powders.

Narcotic.

℞ *Conii pulveris* gr. vi.
Glycyrrhizæ radicis pulveris gr. vi.
Sit pulvis ter quotidie sumendus.

In scirrhous affections, scrofula, painful old ulcers, &c.

℞ *Belladonnæ foliorum pulveris* gr. ii.
Potassæ Nitratis pulveris gr. xv.
Sacchari pulveris gr. ix.
Fiat pulvis horâ somni quotidie sumendus.

In chronic rheumatism, extensive ulcerations, mania, and epilepsy.

℞ *Hydrargyri cum Cretâ* gr. iii.
Opii pulveris gr. i.
Sit pulvis octavâ quâque horâ sumendus.

Antispasmodic.

℞ *Valerianæ radicis pulveris* ℈i.
Cinnamomi comp. pulveris gr. x.
Fiat pulvis ter quaterve quotidie sumendus.

In hysteria, hemicrania, chlorosis.

℞ *Ipecacuanhæ pulveris* gr. iii.
Sodæ carbonatis pulveris gr. xii.
Opii pulveris gr. i.
Fiat pulvis octavâ quâque horâ sumendus.

Spasmodic asthma; hooping-cough.

Tonic.

℞ *Cinchonæ flavæ pulveris* ʒss.
Cinnamomi comp. pulveris gr. x.

* These doses are those proper for adults.

Sit pulvis, secundâ quâque horâ in cyatho lactis, absente febris paroxysmo, sumendus.

In intermittents, after the stomach and bowels have been cleared.

℞ *Ferri potassa-tartratis* gr. viii.
Calumbæ pulveris ℈i.
Fiat pulvis quartâ quâque horâ sumendus.
After diarrhœa, in scrofulous tumours and in atonic dyspepsia.

℞ *Simarubæ corticis pulveris* ℈i.
Opii pulveris gr. ¼.
Pulvis tertiâ quâque horâ sumendus.
In dysentery, after the bowels have been well cleared, and the inflammatory symptoms have abated.

Astringent.

℞ *Catechu pulveris* gr. xx.
Sit pulvis post dejectiones singulas liquidas sumendus.
In diarrhœa, from a weakened state of the bowels.

℞ *Kino compositi pulveris* gr. xv.
Pulvis ex cyatho aquæ menthæ viridis, sextâ quâque horâ sumatur.
In chronic diarrhœa and in intestinal hæmorrhages.

℞ *Cupri sulphatis,* gr. ¼.
Opii pulv. gr. i.
Sacchari puri pulvis gr. v.
Pulvis octavâ quâque horâ sumendus.
In chronic dysentery.

Emetic.

℞ *Ipecacuanhæ pulveris* ℈i.
Antimonii potassio-tartratis gr. i.
Fiat pulvis emeticus.

Cathartic.

℞ *Hydrargyri chloridi* gr. iii.
Jalapæ pulveris gr. xvi.
Sacchari pulv. gr. x.
Sit pulvis, vespere vel primo mane sumendus.
In slimy and obstructed bowels.

℞ *Calomelanos* gr. iii.
Scammonii compositi pulveris gr. xii.
Tere in pulverem, quamprimum sumendam.
In worm cases.

℞ *Potassæ bitartratis* gr. xv.
Cambogiæ,
Sacchari, singulorum gr. v.
Sit pulvis mane nocteque quotidie sumendus.
In ascites, and other dropsical cases.

℞ *Potassæ sulphatis* ʒi.
Rhei pulveris ℈iss.
Florum Anthemidum pulveris ʒi.
Tere in pulverem, et divide in doses æquales sex, quarum æger sumat unam bis die in quovis vehiculo.
In sluggish state of the bowels.

Emmenagogue.

℞ *Foliorum Sabinæ pulveris,*
Zingiberis pulveris āā gr. vii.
Boracis gr. xv.
Fiat pulvis bis in die sumendus.
In amenorrhœa with a languid pulse.

℞ *Calomelanos* gr. i.
Digitalis pulveris gr. i.
Conii pulveris gr. v.
Fiat pulvis, horâ somni quotidie, ad tertiam vicem, sumendus.
In retarded menstruation.

Diuretic.

℞ *Potassæ bitartratis* ℈i.
Scillæ siccatæ pulveris gr. ii.
Zingiberis pulveris gr. iv.
Sit pulvis octavâ quâque horâ sumendus.
In ascites.

Diaphoretic.

℞ *Pulveris Jacobi* gr. iii.
Tragacanthæ comp. pulveris gr. x.
Sit pulvis quartâ vel sextâ quâque horâ sumendus.
In the commencement of febrile diseases, after emptying the stomach and bowels.

℞ *Antimonii potassio-tartratis* gr. ii.
Testarum præparatarum ℈ii.
Intime misceantur in pulverem, et divide in doses æquales decem, quarum æger sumat unam tertiâ quâque horâ.
In puerperal fever, after bleeding, and the exhibition of a clyster.

℞ *Ipecacuanhæ pulveris* gr. ii.
Opii pulveris gr. iss.
Potassæ Nitratis gr. xvi.
Fiat pulvis horâ somni capiendus.
In acute rheumatism.

Expectorant.

℞ *Ipecacuanhæ pulveris* gr. vi.
Potassæ Nitratis pulveris ℈iss.
Myrrhæ pulveris gr. xii.
Misce, et divide in doses æquales quatuor, quarum æger sumat unam quartâ quâque horâ.
In asthma and chronic bronchitis.

REFRIGERANT.

℞ *Potassæ Nitratis* gr. viii.
Tragacanthæ pulveris comp. ℈i.
Tere in pulverem, quartis horis, in cyatho aquæ vel infusi lini sumendam.
In fever.

PILLS.

NARCOTIC.

℞ *Opii* gr. i.
Fiat pilula horâ somni sumenda.
To procure sleep in ordinary cases.

℞ *Digitalis pulveris* gr. iv.
Camphoræ gr. xii.
Hyoscyami extracti gr. xlviii.
Fiant pilulæ duodecem. Sumat tres nocte quotidie.
In maniacal and spasmodic affections.

SEDATIVE.

℞ *Plumbi Acetatis,*
Digitalis pulveris, āā gr. x.
Opii pulveris, gr. iii.
Acaciæ mucilaginis q. s.
Misce optime, et divide in pilulas æquales decem, quarum sumat unam sextâ quâque horâ.
In active hæmorrhages. They have also been given in phthisis, one pill twice a day, after bleeding.

℞ *Plumbi Acetatis* gr. iii.
Micæ panis gr. i.
Fiat pilula sextâ quâque horâ sumenda.
In active hæmorrhages. It should be washed down with f℥j. of distilled vinegar in f℥j. of water.

ANTISPASMODIC.

℞ *Opii* gr. ss.
Castorei gr. viss.
Digitalis pulveris gr. i.
Syrupi q. s.
Fiant pilulæ duæ, bis vel ter quotidie sumendæ.
In spasmodic asthma and dyspnœa.

℞ *Cupri Ammonio-sulphatis,* gr. ii.
Micæ panis q. s.
Fiant pilulæ quatuor. Sumatur una bis quotidie.
In epilepsy, gradually increasing the dose.

STIMULANT.

℞ *Assafœtidæ* ʒii.
Zingiberis pulveris.
Ammoniæ sesquicarbonatis, āā ʒss.
Syrupi q. s.
Ut fiant pilulæ triginta, quarum sumantur tres tertiâ quâque horâ.
In palsy.

TONIC.

℞ *Rhei pulveris,*
Zingiberis pulveris āā ʒss.
Anthemidis extracti ʒi.
Fiat massa in pilulas æquales triginta, dividenda, quarum capiat tres ante prandium quotidie.
In dyspepsia and chlorosis.

℞ *Ferri sesquioxidi,*
Conii extracti, āā ʒi.
Distribue in pilulas æquales viginti quatuor. Sumat duas bis quotidie.
In fluor albus and scrofula.

ASTRINGENT.

℞ *Cinchonæ extracti* ʒii.
Aluminis, ʒi.
Syrupi q. s.
Ut fiant pilulæ triginta sex. Sumat quatuor quartâ vel sextâ quâque horâ.
In passive hæmorrhages.

CATHARTIC.

℞ *Scammonii* gr. iv.
Taraxaci extracti gr. xvi.
Fiant pilulæ sex, quarum sumat tres bis quotidie.
In hypochondriasis and chronic hepatitis.

℞ *Calomelanos* gr. iii.
Jalapæ pulveris gr. ix.
Acaciæ mucilaginis q. s.
Fiant pilulæ tres horâ somni sumendæ.
To empty the bowels in bilious affections.

℞ *Aloes pulveris compositi* i.
Jalapæ pulveris ℈ii.
Lavandulæ olei min. x.
Syrupi q. s.
Ut fiant pilulæ triginta. Sumat duas vel tres, adstricto alvo.
In habitual costiveness.

℞ *Rhei pulveris* ʒiss.
Saponis gr. xv.
Aquæ q. s.
Ut fiant pilulæ viginti quatuor. Sumat tres vel quatuor pro re natâ.
In costiveness arising from a deficiency of bile in the intestinal canal.

EMMENAGOGUE.

℞ *Ferri Sulphatis* ʒss.
Potassæ carbonatis gr. x.
Myrrhæ ʒi.
Aloes pulveris compositi ʒss.
Contunde simul, et dividitur massa in pilulas æquales triginta. Sumat tres bis quotidie.
In amenorrhœa with languid pulse.

℞ *Hydrargyri pilulæ* ʒi.
Divide in pilulas æquales quindecim. Sumat unam mane nocteque quotidie.
In suppression of the menstrual discharge.

DIURETIC.

℞ *Digitalis pulveris* gr. xii.
Calomelanos gr. iv.
Opii gr. iv.
Rosæ confectionis q. s.
Fiant pilulæ duodecim. Sumat unam octavâ quâque horâ.
In hydrothorax, and ascites depending on some visceral obstruction.

℞ *Hydrargyri pilulæ* ʒi.
Scillæ pulveris ℈i.
Rosæ Confectionis q. s.
Fiant pilulæ viginti. Sumat unam octavâ quâque horâ.
In ascites and anasarca.

DIAPHORETIC.

℞ *Antimonii potassio-tartratis* gr. i.
Opii,
Hydrargyri chloridi āā gr. i.
Rosæ confectionis q. s.
Fiant pilulæ æquales duæ, horâ somni sumendæ.
In acute rheumatism.

℞ *Antimonii potassio-tartratis* gr. ii.
Opii gr. vi.
Camphoræ gr. xxxvi.
Spiritus rectificati min. iii.
Rosæ confectionis q. s.
Fiant pilulæ æquales duodecim, quarum sumat unam quartâ quâque horâ.
In fevers.

EXPECTORANT.

℞ *Scillæ pulveris* gr. xxx.
Ammoniaci ʒiss.
Conii extracti gr. xxx.
Contunde simul, et divide massam in pilulas æquales triginta, quarum sumat duas sextâ quâque horâ.
In asthma and chronic catarrh.

SIALOGOGUE.

℞ *Hydrargyri pilulæ* ʒi.
Divide in pilulas æquales duodecim. Sumat unam mane nocteque quotidie.
In syphilis, herpetic eruptions, and chronic hepatitis.

℞ *Hydrargyri chloridi* ℈i.
Opii gr. v.
Rosæ confectionis q. s.
Fiant pilulæ viginti. Sumat unam mane, nocteque quotidie.
In syphilitic cases.

LITHONTRIPTIC.

℞ *Sodæ carbonatis siccatæ* ʒiss.
Cinnamomi pulveris comp. ʒss.
Saponis ʒss.
Balsami Peruviani q. s.
Fiant pilulæ æquales triginta. Sumat tres ter quotidie.
In calculous affections.

TONIC AND PURGATIVE COMBINED.

℞ *Ferri Ammonio-chloridi* ʒi.
Aloes extracti,
Gentianæ extracti, āā ʒss.
Contunde simul, et divide massam in pilulas triginta, quarum sumat duas ter quotidie.
In dyspepsia, hysteria, scrofula, and mesenteric obstructions.

DIAPHORETIC AND ALTERATIVE.

℞ *Hydrargyri sulphureti rubri,*
Serpentariæ radicis, in pulv. āā ℥i.
Aurantii syrupi q. s.
Misce, et divide in pilulas viginti quatuor, quarum sumat quatuor ter quotidie.
In herpetic and other obstinate cutaneous affections.

DRAUGHTS.

NARCOTIC.

℞ *Camphoræ misturæ* f℥iss.
Opii Tincturæ ♏xxxv.
Ætheris sulphurici fʒi.
Croci syrupi fʒi.
Fiat haustus in promptu habendus, et urgente febris paroxysmo sumendus.
In intermittent headache.

℞ *Ammoniæ sesquicarbonatis* gr. xv.
Limonis recentis succi fʒiv.
Aquæ distillatæ f℥i.
Myristicæ spiritus fʒi.
Aurantii syrupi fʒss.
Conii tincturæ ♏x.
Fiat haustus ter quotidie sumendus, addendo, de die in diem, Conii tinct. ♏ij.

donec dosis ad ♏xxx. *pervenerit in singulis haustibus.*

In diseases of increased irritability.

℞ *Potassæ carbonatis* ℈i.
Limonum recentis succi fʒiv.
Menthæ viridis aquæ f℥i.
Opii tincturæ ♏xxv.
Tolutani syrupi fʒss.
Fiat haustus horâ somni, vel vespertino, vel serâ nocte, sumendus.

To procure sleep in the majority of diseases.

ANTISPASMODIC.

℞ *Moschi misturæ* fʒxiv.
Ammoniæ liquoris ♏xvi.
Castorei tincturæ fʒi.
Papaveris syrupi fʒss.
Fiat haustus, quartâ quâque horâ sumendus.

In hysteria, and convulsive affections, after the bowels have been effectually cleared.

℞ *Anisi olei* ♏x.
Magnesiæ ℈i.
Sennæ tincturæ fʒii.
Menthæ piperitæ aquæ fʒx.
Fiat haustus, urgente flatulentia sumendus.

In spasm of the stomach arising from flatulence.

TONIC.

℞ *Cinchonæ flavæ infusi* fʒiss.
Cinchonæ tincturæ comp. fʒi.
Cinchonæ pulveris ℈ii.
Aurantii syrupi fʒss.
Fiat haustus, secundâ quâque horâ sumendus.

In intermittents, and acute rheumatism after purging.

℞ *Cascarillæ infusi* f℥iss.
Cascarillæ tincturæ,
Zingiberis tincturæ, āā fʒi.
Fiat haustus, bis quotidie sumendus.

In dyspepsia, arising from intemperance.

℞ *Myrrhæ* gr. v.
Potassæ Nitratis gr. iv.
Papaveris syrupi fʒss.
Calumbæ infusi fʒxvss.
Fiat haustus, ter die sumendus.

In humoral asthma, chronic catarrh, and phthisis pulmonalis, unattended by much active inflammation.

℞ *Quinæ disulphatis* gr. ii.
Infusi rosæ f℥iss.
Tinct. Cinchonæ comp. fʒi.
Acidi Nitrici ♏iii.
Haustus secundâ quâque horâ absente febre sumendus.

In intermittents.

ASTRINGENT.

℞ *Hæmatoxyli extracti* gr. xii.
Cinnamomi aquæ fʒxv.
Catechu tincturæ fʒi.
Fiat haustus, quartâ quâque horâ vel post dejectiones singulas liquidas, sumendus.

In diarrhœas and protracted dysentery.

EMETIC.

℞ *Ipecacuanhæ pulveris* ℈i.
Ipecacuanhæ vini fʒii.
Aquæ communis fʒvi.
Fiat haustus emeticus, quamprimum, vel vespere sumendus.

For unloading the stomach in ordinary cases.

℞ *Zinci sulphatis* ʒss.
Aquæ distillatæ fʒx.
Fiat haustus, quamprimum sumendus.

In the commencement of the paroxysm of intermittent fever, or in cases of poisons having been taken into the stomach.

℞ *Cupri Sulphatis* gr. x.
Aquæ distillatæ f℥ii.
Fiat haustus emeticus, statim sumendus.

To excite immediate vomiting, when laudanum has been taken as a poison.

CATHARTIC.

℞ *Potassæ Tartratis* ℥i.
Sennæ tincturæ fʒi.
Sennæ infusi fʒxivss.
Croci syrupi fʒss.
Fiat haustus, quamprimum vel primo mane sumendus.

In acute diseases.

℞ *Magnesiæ Sulphatis* ʒii.
Rosæ infusi fʒxiv.
Sulphurici Acidi diluti ♏x.
Mannæ ʒii.
Fiat haustus, quartâ quâque horâ sumendus.

In inflammatory affections, and to check vomiting in low fevers.

℞ *Magnesiæ Carbonatis* ʒi.
Rhei pulveris ℈i.
Menthæ piperitæ aquæ f℥xii.
Fiat haustus, horâ ante prandium sumendus.

In dyspepsia, attended with costiveness and acidity.

℞ *Ricini olei* f℥v.
Acaciæ pulv. ℈i.
Rosæ aquæ f℥viii.
Lavandulæ tinct. comp. ♏viii.
Papaveris syrupi f℥i.
Fiat haustus statim sumendus.
In colic and calculous affections.

DIURETIC.

℞ *Jalapæ tincturæ* f℥iii.
Scillæ aceti f℥i.
Menthæ piperitæ aquæ f℥viii.
Fiat haustus ter in die sumendus.
In dropsy.

℞ *Potassæ Nitratis* gr. viii.
Digitalis tincturæ ♏xvi.
Rosæ infusi f℥xiii.
Rosæ syrupi f℥i.
Fiat haustus ter die sumendus.
In dropsy.

DIAPHORETIC.

℞ *Potassæ sesquicarbonatis* ℈i.
Limonis recentis succi f℥iv.
Antimonii potassio-tartratis gr. $\frac{1}{6}$.
Aquæ distillatæ f℥xi.
Papaveris syrupi f℥i.
Fiat haustus, quartâ vel sextâ quâque horâ sumendus.

℞ *Ammoniæ liquoris Acetatis* f℥vi.
Camphoræ misturæ f℥x.
Potassæ Nitratis gr. x.
Tolutani syrupi f℥ss.
Fiat haustus sextâ quâque horâ sumendus.
In fevers and inflammatory diseases.

REFRIGERANT.

℞ *Potassæ Nitratis* gr. xii.
Amygdalæ misturæ f℥iss.
Tolutani syrupi f℥i.
Fiat haustus quartâ quâque horâ sumendus.

℞ *Potassæ carbonatis* ℈i.
Syrupi f℥ss.
Myristicæ spiritus f℥ss.
Aquæ distillatæ f℥xi.
Fiat haustus in effervescentia cum succi limonis cochleare magno, quartâ quâque horâ sumendus.
In fevers and inflammatory diseases.

ANTACID.

℞ *Magnesiæ* ʒi.
Menthæ piperitæ aquæ f℥iss.
Aurantii tincturæ f℥i.
Fiat haustus pro re natâ sumendus.
In heartburn, and other cases of acidity of the stomach.

℞ *Liquoris Ammoniæ* ♏xvi.
Amygdalæ misturæ f℥ii.
Opii tincturæ ♏x.
Fiat haustus ter die sumendus.
In acidities of the primæ viæ.

MIXTURES.

TONIC.

℞ *Calumbæ infusi* f℥vss.
Cinnamomi tincturæ compositæ f℥ii.
Aurantii syrupi f℥ii.
Fiat mistura, cujus cochlearia duo majora quartâ quâque horâ sumantur.
In debilities of the digestive organs; and to check the severe vomiting which often occurs during pregnancy.

ASTRINGENT.

℞ *Catechu extracti* ʒii.
Cinnamomi aquæ f℥viii.
Fiat mistura, cujus sumantur cochlearia tria majora post singulas dejectiones liquidas.
In the last stage of diarrhœa, or of dysentery.

EMETIC.

℞ *Antimonii potassio-tartratis* gr. viii.
Aquæ distillatæ f℥vi.
Mori syrupi f℥i.
Fiat mistura cujus cochleare magnum quartâ quâque horâ sumendum.

℞ *Ipecacuanhæ pulveris* ʒss.
Antimonii potassio-tartratis gr. i.
Scillæ tincturæ f℥i.
Aquæ distillatæ f℥vi.
Fiat mistura emetica, cujus sumat quamprimum cochlearia majora quatuor, et cochlearia duo sextâ quâque parte horæ, donec supervenerit vomitus.
In dropsies, before exhibiting the foxglove.

CATHARTIC.

℞ *Potassæ Sulphatis* f℥ii.
Aquæ fontanæ f℥vss.
Jalapæ tincturæ f℥iv.
Sit mistura, cujus sumat cochlearia duo majora omni bihorio.

EXPECTORANT.

℞ *Amygdalæ misturæ* f℥v.
Ipecacuanhæ vini,
Scillæ tincturæ āā f℥i.
Tolutani syrupi f℥vi.
Sumat cochleare magnum urgente tussi.

In humoral asthma, and the latter stage of catarrh.

DEMULCENT.

℞ *Decocti Althæ* f℥vi.
Syrupi f℥i.
Fiat mistura, cujus sumatur tertia pars sextâ quâque horâ.
In calculous cases and inflammation of the kidneys.

DETERGENT GARGLE.

Potassæ Nitratis ʒii.
Mellis rosæ fʒiv.
Infusi rosæ f℥vss.
Fiat gargarysma sæpe utendum.
In inflammatory sore throat.

ASTRINGENT GARGLE.

℞ *Infusi rosæ* f℥vii.
Catechu tincturæ fʒvi.
Sulphurici Acidi diluti fʒi.
Opii tincturæ fʒiss.
Sit gargarysma sæpe utendum.
In relaxations of the uvula.

EXTERNAL APPLICATIONS.

LOTIONS.

℞ *Ammoniæ Hydrochloratis* ʒi.
Aquæ fontanæ f℥v.
Spiritus rectificati f℥i.
Misce, ut fiat lotio tumori applicanda.
In swelled testicle and other inflammatory tumours.

℞ *Opii* ʒii.
Aceti distillati f℥vi.
Tere ut fiat lotio parti dolenti applicanda.
To painful swellings of the joints.

℞ *Zinci Sulphatis,*
Plumbi Acetatis, āā gr. x.
Aquæ rosæ,
Aquæ sambuci, āā f℥iii.
Cola ut fiat collyrium subinde utendum.
In ophthalmia after local bleeding.

℞ *Plumbi Acetatis* gr. ix.
Aquæ rosæ f℥vss.
Aceti distillati f℥iii.
Spiritus rectificati fʒi.
Misce, ut fiat collyrium sæpe utendum.
In the acute stage of ophthalmia.

EMBROCATIONS.

STIMULANT.

℞ *Linimenti ammoniæ fortioris* fʒvi.
Olei olivæ fʒii.
Fiat embrocatio, cum panno laneo, cervici applicanda.
In cynanche tonsillaris.

STIMULANT AND ANODYNE.

℞ *Linimenti camphoræ comp.* fʒix.
Cantharidis tincturæ fʒi.
Opii tincturæ fʒii.
Parti dolenti applicandum.
To be rubbed over the bowels in colic, and cramp; and on the joints in painful affections of these parts.

POWDERS.

℞ *Acaciæ pulveris* ℥ss.
Aluminis gr. v.
Misce diligentissime, ut fiat pulvis, mamillis pro re natâ applicanda.
In sore nipples to be applied after suckling.

℞ *Plumbi Acetatis* ʒi.
Cinchonæ pulveris ʒvii.
Tere, ut fiat pulvis, cujus pauxillum super ulceres omni mane spargatur.
For scrofulous ulcers.

OINTMENTS.

℞ *Hydrargyri nitrico-oxydi* ℈ii.
Adipis ℥i.
Tere diligenter in mortario, donec bene misceantur.
In ulcerations of the eyelids.

℞ *Zinci oxydi* ℈i.
Adipis ℥i.
Tere optime in mortario, ut fiat unguentum.

No. VI.

POSOLOGICAL TABLE.

Absinthium ℈j. to ʒj.
Acacia ℈j. to ʒiij.
Acetum fʒij. to fʒx.
—— colchici fʒss. to fʒj.
—— scillæ ♏xx. to fʒij.
Acidum benzoicum grs. x. to ʒss.
—— citricum grs. x. to ʒss.
—— gallicum grs. iij. to ℈j.
—— hydrochloricum ♏v. to ♏xx.
—— dilutum ♏xx. to fʒj.
—— hydrocyanicum dilutum ♏v.
—— nitricum dilutum ♏x. to ♏xl.
—— phosphoricum dilutum ♏xx. to fʒj.
—— sulphuricum dilutum ♏x. to ♏xl.
—— tartaricum grs. x. to ʒss.
—— tannicum grs. iij. to ℈j.
Aconiti folia gr. j. to grs. v.
Æther ♏xxx. to fʒij.
Aloes extractum grs. iij. to grs. xv.
Alumen grs. x. to ℈j.
Ammoniæ sesquicarbonas grs. v. to grs. xv.
—— hydrochloras grs. x. to ʒss.
Ammoniacum grs. x. to ʒss.
Anethi fructus grs. x. to ʒj.
Anisi fructus grs. x. to ʒj.
Anthemidis flores grs. x. to ʒss.
Antimonii oxysulphuretum gr. j. to grs. iv.
—— sesquisulphuretum grs. x. to ʒss.
—— potassio-tartras gr. $\frac{1}{8}$ to grs. iij.
Aqua anethi f℥j. to f℥ij.
—— carui f℥j. to f℥ij.
—— cinnamomi f℥j. to f℥ij.
—— fœniculi f℥j. to f℥ij.
—— menthæ piperitæ f℥j. to f℥ij.
—— menthæ viridis f℥j. to f℥ij.
—— pimentæ f℥j. to f℥ij.
—— pulegii f℥j. to f℥ij.
Argenti nitras gr. $\frac{1}{8}$ to gr. j.
Armoraciæ radix ℈j. to ʒj.
Arseniosum acidum gr. $\frac{1}{40}$ to gr. $\frac{1}{4}$.
Asari folia gr. x. to ℈j.
Assafœtida grs. x. to ʒss.
Balsamum peruvianum ♏x. to ♏xxx.
—— tolutanum grs. x. to ʒss.
Belladonnæ folia gr. ss. to grs. v.
Benzoinum grs. x. to ʒss.
Bismuthi trisnitras grs. iv. to grs. xv.
Bistortæ radix grs. x. to ʒj.
Cajuputi oleum ♏j. to ♏v.
Calami radix grs. x. to ʒss.
Calumba grs. x. to ʒss.
Calcii chloridum gr. j. to grs. v.
Cambogia grs. ij. to grs. x.
Camphora grs. iv. to ℈j.
Canellæ cortex grs. x. to ʒss.
Cantharis gr. ss. to grs. ij.
Capsici baccæ grs. v. to grs. x.
Carbo ligni grs. x. to ʒss.
Cardamomi semina grs. v. to ʒss.
Carui fructus grs. v. to ʒss.
Caryophylli grs. v. to ʒss.
—— oleum ♏j. to ♏v.
Cascarillæ cortex grs. x. to ʒj.
Cassiæ pulpa ʒss. to ℥j.
Castoreum grs. v. to ℈j.
Catechu grs. x. to ℈ij.
Centaurii cacumina grs. x. to ʒj.
Cetaceum ℈j. to ʒss.
Cinchonæ flavæ cortex grs. x. to ʒij.
—— pallidæ cortex grs. x. to ʒij.
—— rubræ cortex grs. x. to ʒij.
Cinnamomi cortex grs. v. to ℈j.
—— oleum ♏j. to ♏ij.
Coccus gr. j. to ℈j.
Colchici cormus gr. j. to grs. v.
—— semina gr. j. to grs. v.
Colocynthidis pulpa gr. j. to grs. v.
Confectio-amygdalarum ʒj. to ʒij.
—— aromatica ℈ss. to ʒj.
—— aurantiorum ʒj. to ℥j.
—— cassiæ ʒij. to ℥j.
—— opii ℈j. to ʒiv.
—— piperis grs. x. to ʒj.
—— rosæ caninæ ʒj. to ʒij.
—— rosæ gallicæ ʒj. to ʒij.
—— rutæ ʒss. to ʒj.
—— scammoniæ ℈j. to ʒj.
—— sennæ ʒij. to ʒvj.
Conii folia grs. v. to ℈j.
Contrayervæ radix grs. x. to ℈ij.
Copaiba ♏x. to fʒij.
Coriandri fructus ℈j. to ʒj.
Creta præparata grs. xv. to ʒij.
Croci stigmata grs. x. to ʒj.
Cubeba grs. x. to ʒij.
Cupri ammonio-sulphas gr. $\frac{1}{4}$ to gr. j.
Cupri sulphas gr. $\frac{1}{6}$ to gr. j.
Cuspariæ cortex grs. x. to ʒj.
Cymini fructus ℈j. to ʒj.
Dauci radix, semina ℈j. to ʒj.
Decoctum aloes compositum fʒiv. to f℥ij.
—— cetrariæ f℥j. to f℥ij.

Decoctum chimaphilæ f℥j. to f℥ij.
—— cinchonæ f℥j. to f℥ij.
—— cydoniæ f℥j. to f℥ij.
—— dulcamaræ fʒiv. to f℥ij.
—— hordei *ad libitum.*
—— hordei compositum *ad libitum.*
—— malvæ compositum *ad libitum.*
—— quercus fʒij. to f℥j.
—— sarzæ f℥iv. to f℥viij.
—— sarzæ compositum f℥iv. to f℥viij.
—— scoparii compositum f℥j. to f℥ij.
—— senegæ f℥iss. to f℥iij.
—— tormentillæ f℥j. to f℥iss.
—— ulmi f℥iv. to f℥viij.
—— uva ursi ℥j. to ℥iv.
Digitalis folia gr. ss. to grs. iij.
Elaterium gr. $\frac{1}{16}$ to gr. ss.
Extractum aconiti gr. ss. to grs. v.
—— aloes purificatum grs. vj. to grs. x.
—— anthemidis grs. v. to ℈j.
—— belladonnæ gr. $\frac{1}{4}$ to grs. ij.
—— cinchonæ grs. x. to ʒss.
—— colchici aceticum gr. i. to grs. v.
—— colchici cormi gr. i. to grs. v.
—— colocynthidis grs. v. to ℈j.
—— colocynthidis compositum grs. v. to ℈j.
—— conii grs. iij. to grs. xx.
—— gentianæ grs. x. to ʒss.
—— glycyrrhizæ grs. x. to ʒj.
—— hæmatoxyli grs. x. to ʒj.
—— hyoscyami grs. v. to ℈j.
—— jalapæ grs. x. to ℈j.
—— lactucæ grs. v. to ℈j.
—— opii gr. j. to grs. v.
—— papaveris grs. iij. to grs. xij.
—— pareiræ grs. x. to ʒss.
—— rhei grs. x. to ℈j.
—— sarzæ grs. v. to ʒj.
—— strammonii gr. $\frac{1}{2}$ to grs. ij.
—— taraxaci grs. x. to ʒj.
—— uvæ ursi grs. v. to ℈j.
Ferri ammonio-chloridum grs. iij. to ℈j.
—— ammonio-citras grs. v. to ℈j.
—— carbonas cum saccharo grs. v. to ℈j.
—— ramenta et fila grs. v. to ℈j.
—— sesquioxydi grs. x. to ʒij.
—— sulphas gr. j. to grs. v.
—— potassio-tartras grs. v. to ℈j.
Fœniculi fructus grs. x. to ʒss.
Galbani gumma resina grs. x. to ʒss.
Gallæ grs. x. to ℈j.
Gentianæ radix grs. x. to ʒss.
Granati cortex ℈j. to ʒj.
Guaiaci resina et lignum grs. x. to ʒss.
Hydrargyri bichloridum gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$.
—— chloridum gr. ss. to grs. x.
—— sulphuretum cum sulphure grs. x. to ʒss.
Hydrargyrum cum creta grs. v. to ℈j.
Hyosciami folia et semina grs. v. to grs. x.
Infusum anthemidis f℥j. to f℥ij.
—— armoraciæ compositum f℥j. to f℥ij.
Infusum aurantii compositum f℥j. to f℥ij.
—— calumbæ f℥j. to f℥ij.
—— carophylli f℥j. to f℥ij.
—— cascarillæ f℥jss. to f℥ij.
—— catechu compositum f℥j. to f℥iij.
—— cinchonæ f℥j. to f℥ij.
—— cinchonæ spissatum ♏xx. to ʒij.
—— cuspariæ f℥j. to f℥ij.
—— digitalis fʒj. to fʒvj.
—— gentianæ compositum f℥jss. to f℥ij.
—— lini *ad libitum.*
—— quassiæ f℥jss. to f℥ij.
—— rhei f℥j. to f℥ij.
—— rosæ compositum f℥j. to f℥ij.
—— scoparii f℥j. to f℥ij.
—— serpentariæ f℥j. to f℥ij.
—— sennæ compositum f℥j. to f℥ij.
—— simarubæ f℥j. to f℥ij.
—— tabaci ♏x. to ♏xx.
—— valerianæ f℥j. to f℥ij.
Iodinii gr. $\frac{1}{6}$ to grs. iv.
Ipecacuanhæ radix gr. ss. to grs. xxx.
Jalapæ radix grs. x. to ℈j.
Kino grs. x. to ʒss.
Krameriæ radix grs. x. to ʒss.
Lavandulæ flores grs. x. to ʒj.
Lauri baccæ et folia grs. x. to ʒss.
Lichen ℈j. to ʒj.
Liquor ammoniæ ♏x. to ♏xxx.
—— ammoniæ acetatis fʒiv. to f℥j.
—— ammoniæ sesquicarbonatis fʒss. to fʒj.
—— calcis f℥j. to f℥iv.
—— chloridi calcii ♏xv. to fʒij.
—— hydrargyri bichloridi ♏x. to fʒj.
—— morphiæ acetatis ♏x. to ♏xl.
—— morphiæ hydrochloratis ♏x. to ♏xl.
—— potassæ ♏x. to fʒj.
—— potassæ carbonatis ♏x. to fʒij.
—— potassæ arsenitis ♏ij. to ♏xx.
—— potassii iodidi comp. fʒj. to fʒvj.
Magnesia ℈j. to ʒj.
—— carbonas ʒss. to ʒij.
—— sulphas ʒss. to ℥j.
Malva ℈j. to ʒj.
Manna ʒiv. to ℥ij.
Marrubium ℈j. to ʒj.
Mastiche grs. x. to ʒss.
Mentha piperita grs. x. to ʒj.
—— viridis grs. x. to ʒj.
Menyanthes ʒss. to ʒj.
Mezerei cortex gr. j. to grs. x.
Mistura ammoniaci fʒiij. to f℥j.
—— amygdalarum f℥ij. to f℥iij.
—— assafœtidæ fʒiv. to f℥j.
—— camphoræ f℥j. to f℥iij.
—— cretæ f℥j. to f℥ij.
—— ferri composita fʒiv. to f℥j.
—— gentianæ composita f℥j. to f℥jss.
—— guaiaci f℥jss. to f℥ij.
—— moschi f℥j. to f℥ij.
Morphiæ acetas gr. $\frac{1}{4}$ to gr. j.

Morphiæ hydrochloras gr. $\frac{1}{4}$ to gr. j.
Moschus grs. ij. to ʒj.
Myristicæ nuclei grs. v. to grs. x.
Myrrha grs. x. to ʒss.
Oleum æthereum ♏j. to ♏v.
—— amygdalæ fʒij. to f℥j.
—— anisi ♏j. to ♏v.
—— anthemidis ♏j. to ♏v.
—— carui ♏j. to ♏v.
—— copaibæ ♏x. to ʒss.
—— juniperi ♏j. to ♏v.
—— lavandulæ ♏j. to ♏v.
—— lini fʒiv. to f℥j.
—— menthæ piperitæ ♏j. to ♏v.
—— menthæ viridis ♏j. to ♏x.
—— morrhuæ ʒj. to ʒvi.
—— origani ♏j. to ♏v.
—— pimentæ ♏j. to ♏v.
—— pulegii ♏j. to ♏v.
—— ricini fʒiv. to f℥jss.
—— rosmarini ♏ij. to ♏x.
—— succini ♏v. to ♏xv.
—— terebinthinæ rectificatum ♏v. to f℥j.
—— tiglii ♏$\frac{1}{4}$. to ♏v.
Olibanum grs. x. to ʒss.
Olivæ oleum fʒiv. to f℥j.
Opium gr. ss. to grs. iv.
Opoponax grs. v. to ʒss.
Oxymel fʒss. to fʒij.
—— scillæ fʒss. to fʒij.
Petroleum grs. x. to ʒj.
Pilulæ aloes compositæ grs. v. to ℈j.
—— aloes cum myrrha grs. v. to ℈j.
—— cambogiæ comp. grs. v. to ℈j.
—— colocynthidis comp. grs. v. to ʒss.
—— conii comp grs. iij. to grs x
—— ferri compositæ grs. x. to ℈j.
—— galbani compositæ grs. x. to ℈j.
—— hydrargyri gr. j. to grs. x.
—— hydrargyri chloridi comp. grs. v. to grs. x.
—— rhei comp. grs. x. to ʒss.
—— saponis cum opio grs. v. to grs. x.
—— scillæ compositæ grs. x. to ℈j.
Pimentæ baccæ grs. v. to ℈j.
Piperis longi fructus grs. v. to ℈j.
—— nigri baccæ gr. j. to ℈j.
Pix liquida grs. x. to ʒj.
Plumbi acetas gr. j. to grs. x.
—— iodidum gr. ss. to grs. ij.
Potassæ acetas grs. x. to ʒj.
—— carbonas grs. x. to ʒss.
—— nitras grs. x. to ʒj.
—— bicarbonas grs. x. to ʒj.
—— sulphas grs. x. to ʒj.
—— sulphuretum grs. ij. to grs. vj.
—— bisulphas grs. xv. to ʒiij.
—— bitartras grs. x. to ʒj.
—— tartras ℈j. to ʒvj.
Potassii iodidum grs. ij. to grs. x.
Pulvis aloes compositus grs. v. to grs. x.
—— antimonii comp. grs. v. to grs. x.
—— cinnamomi comp. grs. v. to grs. x.
Pulvis cretæ compositus grs. x. to ℈j.
—— cretæ compositus c. opio grs. x. to ℈j.
—— jalapæ compositus grs. xv. to ℈ij
—— ipecacuanhæ compositus grs. v. to grs. x.
—— kino compositus grs. x. to ℈j.
—— scammonii compositus grs. v. to ℈j.
—— tragacanthæ compositus grs. x. to ʒj.
Quassia grs. v. to ʒss.
Quercus cortex grs. x. to ʒss.
Quinæ disulphas grs. j. to grs. x
Rhamni baccæ ℈j. to ʒij.
Rhei radix grs. x. to ʒss.
Ricini oleum fʒij. to f℥j.
Rosæ caninæ pulpa ℥j. to ℥ij.
—— centifoliæ petala ℈j. to ʒ j.
—— gallicæ petala ℈j. to ʒj.
Rosmarini cacumina grs. x. to ʒss.
Rutæ folia grs. x. to ℈ij.
Sabinæ folia grs. v. to grs. x.
Sagapenum grs. x. to ʒss.
Salicis cortex grs. xv. to ʒss.
Sapo durus grs. v. to ʒss.
Sarzæ radix ℈j. to ʒj.
Sassafras lignum et radix ℈j. to ʒj.
Scammonium grs. v. to ℈j.
Scillæ radix exsiccata gr. j. to grs. iv.
Senegæ radix ℈j. to ℈ij.
Senna ℈j. to ʒj.
Serpentariæ radix grs. x. to ʒss.
Simarubæ cortex grs. x. to ʒss.
Sinapis semina grs. x. to ʒss.
—— (emetic) ʒij. to ʒiv.
Sodæ biboras grs. x. to ʒss.
—— bicarbonas grs. x. to ʒss.
—— carbonas grs. x. to ʒss.
—— carbonas exsiccata grs. v. to grs. xv.
—— chloridum grs. x. to ʒj.
—— sulphas ʒiv. to ℥j.
Spartii cacumina grs. x. to ʒss.
Spigeliæ radix grs. x. to ℈ij.
Spiritus ætheris nitrici ♏x. to fʒj.
—— ætheris ♏x. to fʒj.
—— ætheris compositus ♏xv. to fʒj.
—— ammoniæ aromaticus ♏x. to fʒj.
—— ammoniæ fœtidus ♏x. to fʒj.
—— anisi fʒij. to fʒiv.
—— armoraciæ comp. fʒij. to fʒiv.
—— carui fʒij. to fʒiv.
—— cinnamomi fʒij. to fʒiv.
—— juniperi compositus fʒij. to f℥j.
—— lavandulæ ♏x. to fʒj.
—— lavandulæ compositus ♏xx. to fʒij.
—— menthæ piperitæ ♏xx. to fʒij.
—— menthæ viridis ♏xx to fʒij.
—— myristicæ fʒj. to fʒij.
—— pimentæ fʒj. to fʒij.
—— pulegii fʒj. to fʒij.
—— rosmarini fʒj. to fʒij.
Spongia usta grs. x. to ʒss.
Strychnia gr. $\frac{1}{20}$ to gr. $\frac{1}{4}$.
Sulphur ℈j. to ʒj.
Syrupus fʒj. to f℥j.

Syrupus altheæ fʒj. to fʒvj.
—— aurantii fʒj. to fʒiv.
—— croci fʒss. to fʒij.
—— ferri iodidi ♏x. to ʒj.
—— limonum fʒj. to fʒiv.
—— mori fʒj. to fʒiv.
—— papaveris fʒj. to f℥j.
—— rhœados fʒj. to fʒij.
—— rhamni fʒj. to fʒvj.
—— rosæ fʒj. to f℥j.
—— sennæ fʒj. to f℥j.
—— tolutani fʒss. to fʒij.
—— zingiberis fʒss. to fʒij.
Tabaci folia gr. ss. to grs. iv.
Tamarindi pulpa ʒiv. to ℥j.
Terebinthina canadensis ℈j. to ʒj.
—— chia ℈j. to ʒj.
—— vulgaris oleum fʒss. to f℥j.
Tinctura aloes fʒiv. to f℥j.
—— aloes composita fʒj. to fʒiv.
—— ammoniæ composita ♏v. to ♏x.
—— assafœtidæ fʒss. to fʒij.
—— aurantii fʒj. to fʒiv.
—— benzoini composita fʒss. to fʒij.
—— calumbæ fʒj. to fʒiv.
—— camphoræ composita fʒj. to fʒiv.
—— cantharidis ♏x. to fʒss.
—— capsici ♏x. to fʒss.
—— cardamomi fʒj. to fʒiv.
—— cardamomi composita fʒj. to fʒiv.
—— cascarillæ fʒj. to fʒiv.
—— castorei fʒj. to fʒiv.
—— catechu fʒj. to fiv.
—— cinchonæ fʒj. to fʒiv.
—— cinchonæ composita f j. to fʒiv.
—— cinnamomi fʒj. to fʒij.
—— cinnamomi composita fʒj. to fʒij.
—— conii f ss. to fʒij.
—— digitalis ♏x. to ♏xl.

Tinctura ferri ammonio-chloridi fʒj. to fij.
—— sesquichloridi ♏x. to fʒj.
—— gentianæ composita fʒj. to fʒij.
—— guaiaci composita ♏xv. to fʒj.
—— hellebori ♏xx. to fʒj.
—— lupuli fʒss. to fʒij.
—— hyoscyami fʒss. to fʒij.
—— jalapæ fʒj. to fʒiij.
—— kino fʒj. to fʒij.
—— lavandulæ composita fʒj. to fʒij.
—— myrrhæ ♏xx. to fʒj.
—— opii ♏x. to fʒj.
—— rhei fʒj. to fʒiv.
—— rhei composita fʒj. to fʒiv.
—— scillæ ♏x. to fʒj.
—— sennæ fʒj. to fʒij.
—— serpentariæ fʒj. to fʒiv.
—— valerianæ fʒj. to fʒij.
—— valerianæ composita fʒss. to fʒj.
—— zingiberis grs. x. to fʒj.
Tormentillæ radix grs. x. to fʒss.
Tragacantha grs. x. to ʒj.
Ulmi cortex grs. x. to ʒj.
Uvæ ursi grs. x. to ʒj.
Valerianæ radix ℈j. to ʒij.
Veratria gr. $\frac{1}{10}$.
—— radix grs. ij. to grs. vj.
Vinum antimonii potassio-tartratis ♏xv. to fʒj.
—— (emetic) fʒj. to f℥ij.
—— aloes fʒiv. to f℥ij.
—— colchici ♏xv. to fʒj.
—— ipecacuanhæ ♏xx. to fʒj.
—— (emetic) fʒj. to f℥jss.
—— opii ♏x. to fʒj.
—— veratri ♏x. to ♏xx.
Zinci oxydum gr. j. to grs. x.
—— sulphas gr. j. to ʒss.
—— valerianas gr. $\frac{1}{2}$ to grs. iij.
Zingiberis radix grs. v. to ʒss.

TABLE

Showing the Proportion in which Opium and Morphia and certain Preparations of Antimony, Arsenic, and Mercury are contained in some important compound Medicines.

OPIUM and MORPHIA.

ACETUM OPII, Dub. Edin. *Vinegar of Opium.* Each fluid drachm of the Dublin preparation contains about four grains of opium; the Edinburgh is more than three times the strength.

CONFECTIO OPII, Lond. *Confection of Opium.* Thirty grains contain one grain of opium.

ELECTUARIUM OPII, Edin. *Electuary of Opium* contains one grain of opium in about two scruples.

ELECTUARIUM CATECHU, Edin. *Electuary of Catechu* contains in each ounce about two grains and a half of opium; or one hundred and ninety-three grains contain one grain of opium.

ENEMA OPII, Lond. *Clyster of Opium.* Each ounce contains seven and a half minims of tincture of opium, or rather more than half a grain of opium.

LINIMENTUM OPII, Lond. *Liniment of Opium.* Half a fluid ounce contains about four and a half grains of opium.

LIQUOR MORPHIÆ ACETATIS, Lond. Dub. *Solution of Acetate of Morphia.* One grain of the acetate of morphia is contained in about sixty minims of the London, and in one hundred and twenty minims of the Dublin preparation.

LIQUOR MORPHIÆ HYDROCHLORATIS, Lond. MORPHIÆ MURIATIS SOLUTIO VEL LIQUOR, Edin. Dub. *Solution of Hydrochlorate of* MORPHIA. One grain of the salt is contained in sixty minims of the London solution, and is about one hundred and seven minims of the Edinburgh and Dublin solutions.

PILULÆ CALOMELANOS ET OPII, Edin. *Pills of Calomel and Opium.* About one grain of opium is contained in five grains of the pills.

PILULÆ IPECACUANHÆ ET OPII, Edin. *Pills of Ipecacuanha and Opium.* A scruple of this preparation contains a grain and a half of opium.

PILULÆ OPII, Edin. *Opium*, or *Thebaic Pills.* A pill of five grains contains a grain of opium.

PILULÆ PLUMBI OPIATÆ, Edin. *Pills of Lead and Opium.* One grain of opium is contained in eight grains of the pill, or twice the quantity of opium may be employed.

PILULÆ SAPONIS COMP. Lond. Dub. *Compound Pills of Soap.* Five grains contain one grain of opium.

PILULÆ STYRACIS COMP. Lond. Edin. *Compound Pills of Storax.* Five grains of the London pills contain one grain of opium; four of the Edinburgh contain the same quantity.

PULVIS CRETÆ COMPOSITUS CUM OPIO, Lond. *Compound Powder of Chalk with Opium.* Two scruples contain one grain of opium.

PULVIS CRETÆ OPIATUS, Edin. Dub. *Opiate Chalk Powder* contains one grain of opium in two scruples of the powder.

PULVIS IPECACUANHÆ COMPOSITUS, Lond. Edin. Dub. *Compound Powder of Ipecacuanha.* Ten grains contain one grain of opium.

PULVIS KINO COMPOSITUS, Lond. *Compound Powder of Kino.* Each scruple contains one grain of opium.

TINCTURA CAMPHORÆ COMPOSITA, Lond. *Compound Tincture of Camphor.* TINCTURA OPII CAMPHORATA, Edin. Dub. Each fluid ounce of the Edinburgh tincture contains two grains of opium; the London preparation is rather weaker, the Dublin slightly stronger, supposing that the same opium is employed.

TINCTURA OPII, Lond. Edin. *Tincture of Opium.* Thirteen minims and a half contain one grain of opium; the Dublin tincture is rather stronger.

TINCTURA OPII AMMONIATA, Edin. *Ammoniated Tincture of Opium.* Eighty minims contain the active matter of one grain of opium.

TROCHISCI MORPHIÆ, Edin. *Morphia Lozenges.* Each lozenge contains one-fortieth grain of muriate of morphia.

TROCHISCI MORPHIÆ ET IPECACUANHÆ, Edin. *Morphia and Ipecacuanha Lozenges.* Each lozenge contains one-fortieth grain of muriate of morphia.

TROCHISCI OPII, Edin. *Troches of Opium.* Seven lozenges contain one grain of opium.

VINUM OPII, Lond. Edin. Dub. *Wine of Opium.* The Edinburgh and Dublin preparations are of the same strength as the cor-

responding tinctures. In the London, extract of opium being employed, the strength is difficult to compute; it is probably, however, about the same as the tincture of opium.

ANTIMONY.

LIQUOR, ANTIMONII TARTARIZATI, Dub. *Solution of Tartar Emetic* contains two grains of tartrate of antimony and potassa in each ounce.

VINUM ANTIMONIALE, Edin. *Antimonial Wine* contains in each ounce two grains of tartrate of antimony and potassa.

VINUM ANTIMONII POTASSIO-TARTRATIS, Lond. *Solution of Tartarized Antimony* contains in each fluid ounce two grains of potassio-tartrate of antimony.

ARSENIC.

ARSENICI ET HYDRARGYRI HYDRIODATIS LIQUOR, Dub. *Solution of Hydriodate of Arsenic and Mercury.* Each fluid drachm contains about one-twelfth grain of arsenic, and one-fourth grain of mercury.

LIQUOR ARSENICI CHLORIDI, Lond. *Solution of Chloride of Arsenic.* One fluid ounce contains a grain and a half of arsenious acid.

LIQUOR POTASSÆ ARSENITIS, Lond. Dub. SOLUTIO ARSENICALIS, Edin. *Arsenical Solution.* One fluid ounce contains four grains of arsenious acid.

MERCURY.

HYDRARGYRUM CUM MAGNESIA, Dub. *Mercury with Magnesia.* Three grains contain one of mercury.

HYDRARGYRUM CUM CRETA, Lond. Edin. *Mercury with Chalk.* Eight grains contain three grains of mercury.

HYDRARGYRUM CUM CRETA, Dub. *Mercury with Chalk.* Three grains contain one of mercury.

LIQUOR HYDRARGYRI BICHLORIDI, Lond. *Solu-*

tion of Bichloride of Mercury. Two fluid ounces contain one grain of bichloride of mercury.

PILULA HYDRARGYRI CHLORIDI COMPOSITA, Lond. *Pills of Chloride of Mercury.* Six grains contain one grain of chloride of mercury.

PILULÆ CALOMELANOS COMPOSITÆ, Edin. Dub. *Compound Calomel Pills* contain one grain of mercury in six grains (*Edin.*), in five grains (*Dub.*).

PILULÆ HYDRARGYRI, Lond. Edin. Dub. *Mercurial Pills.* Three grains contain one grain of mercury.

UNGUENTUM HYDRARGYRI, Lond. Edin. Dub. *Stronger Mercurial Ointment.* Two drachms contain one drachm of mercury.

APPENDIX II.

VARIOUS TABLES.

No. I.
TABLES OF SIMPLE AFFINITY.

The following Tables were drawn up by Bergman, and additions made to them by others at different times. The substance, the attractions of which are to be shown, is placed at the head of a column, and the substances to which it has an attraction placed beneath, in the order of the forces of attraction.

Oxygen.

Carbon
Charcoal
Manganese
Zinc
Iron
Tin
Antimony
Hydrogen
Phosphorus
Sulphur
Arsenic
Nitrogen
Nickel
Cobalt
Copper
Bismuth
Mercury
Silver
Arsenious acid
Nitric oxide
Gold
Platinum
Carbonic oxide
Hydrochloric acid
White oxide of manganese
White oxide of lead

Oxygen.[1]

Titanium
Manganese
Zinc
Iron
Tin
Uranium
Molybdena
Tungsten
Cobalt
Antimony
Nickel
Arsenic
Chrome
Bismuth
Lead
Copper
Tellurium
Platinum
Mercury
Silver
Gold

Carbon.

Oxygen
Iron
Hydrogen

Nitrogen.

Oxygen
Sulphur
Phosphorus
Hydrogen

Hydrogen.

Oxygen
Sulphur
Carbon
Phosphorus
Nitrogen

Sulphur.
Phosphorus.

Potassa
Soda
Iron
Copper
Tin
Lead
Silver
Bismuth
Antimony
Mercury
Arsenic
Molybdenum

Potassa, Soda, and Ammonia.

Acids:
Sulphuric
Nitric
Hydrochloric
Phosphoric
Fluoric
Oxalic
Tartaric
Arsenic
Succinic
Citric
Lactic
Benzoic
Sulphurous
Acetic
Mucic
Boracic
Nitrous
Carbonic
Hydrocyanic
Oil
Water
Sulphur

Barytes.

Acids:
Sulphuric
Oxalic
Succinic
Fluoric
Phosphoric
Mucic
Nitric
Hydrochloric
Suberic
Citric
Tartaric
Arsenic
Lactic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic
Sulphur
Phosphorus
Water
Fixed Oils

Strontia.

Acids:
Sulphuric
Phosphoric
Oxalic
Tartaric
Fluoric
Nitric
Hydrochloric
Succinic
Acetic
Arsenic
Boracic

[1] Vauquelin's Table of the affinity of the metals for oxygen, according to the difficulty with which their oxides are decomposed by heat.

TABLES OF SIMPLE AFFINITY—*continued.*

Acids:
Carbonic
Water

LIME.

Acids:
Oxalic
Sulphuric
Tartaric
Succinic
Phosphoric
Mucic
Nitric
Hydrochloric
Suberic
Fluoric
Arsenic
Lactic
Citric
Malic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic
Sulphur
Phosphorus
Water
Fixed oil

MAGNESIA.

Acids:
Oxalic
Phosphoric
Sulphuric
Fluoric
Arsenic
Mucic
Succinic
Nitric
Hydrochloric
Tartaric
Citric
Malic
Lactic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic
Sulphur

ALUMINA.

Acids:
Sulphuric
Nitric
Hydrochloric
Oxalic
Arsenic
Fluoric
Tartaric
Succinic
Mucic
Citric
Phosphoric
Lactic
Benzoic
Acetic
Boracic
Sulphurous
Nitrous
Carbonic
Hydrocyanic

SILEX.

Fluoric acid
Potassa

OXIDE OF PLATINA.
OXIDE OF GOLD.[1]

Acids:
Gallic
Hydrochloric
Nitric
Sulphuric
Arsenic
Fluoric
Tartaric
Phosphoric
Oxalic
Citric
Acetic
Succinic
Hydrocyanic
Carbonic
Ammonia

OXIDE OF SILVER.

Acids:
Gallic
Hydrochloric
Oxalic
Sulphuric
Mucic
Phosphoric
Sulphurous
Nitric
Arsenic
Fluoric
Tartaric
Citric
Lactic
Succinic
Acetic
Hydrocyanic
Carbonic
Ammonia

OXIDE OF MERCURY.

Acids:
Gallic
Hydrochloric
Oxalic
Succinic
Arsenic
Phosphoric
Sulphuric
Mucic
Tartaric
Citric
Malic
Sulphurous
Nitric
Fluoric
Acetic
Benzoic
Boracic
Hydrocyanic
Carbonic

OXIDE OF LEAD.

Acids:
Gallic
Sulphuric
Mucic
Oxalic
Arsenic
Tartaric
Phosphoric
Hydrochloric
Sulphuric
Suberic
Nitric
Fluoric
Citric
Malic
Succinic
Lactic
Acetic
Benzoic
Boracic
Hydrocyanic
Carbonic
Fixed oils
Ammonia

OXIDE OF COPPER.

Acids:
Gallic
Oxalic
Tartaric
Hydrochloric
Sulphuric
Mucic
Nitric
Arsenic
Phosphoric
Succinic
Fluoric
Citric
Lactic
Acetic
Boracic
Hydrocyanic
Carbonic
Fixed alkalies
Ammonia
Fixed oils

OXIDE OF ARSENIC.

Acids:
Gallic
Hydrochloric
Oxalic
Sulphuric
Nitric
Tartaric
Phosphoric
Fluoric
Succinic
Citric
Acetic
Hydrocyanic
Fixed alkalies

[1] Omitting the oxalic, citric, succinic, and carbonic, and adding sulphuretted hydrogen after ammonia.

TABLES OF SIMPLE AFFINITY—*continued*.

Ammonia
Fixed oils
Water

OXIDE OF IRON.

Acids:
Gallic
Oxalic
Tartaric
Camphoric
Sulphuric
Mucic
Hydrochloric
Nitric
Phosphoric
Arsenic
Fluoric
Succinic
Citric
Lactic
Acetic
Boracic
Hydrocyanic
Carbonic

OXIDE OF TIN.

Acids:
Gallic
Hydrochloric
Sulphuric
Oxalic
Tartaric
Arsenic
Phosphoric
Nitric
Succinic
Fluoric
Mucic
Citric
Lactic
Acetic
Boracic
Hydrocyanic
Ammonia

OXIDE OF ZINC.

Acids:
Gallic
Oxalic
Sulphuric
Hydrochloric
Mucic
Nitric
Tartaric
Phosphoric
Citric
Succinic
Fluoric
Arsenic
Lactic
Acetic
Boracic
Hydrocyanic
Carbonic
Fixed alkalies
Ammonia

OXIDE OF ANTIMONY.

Acids:
Gallic
Hydrochloric
Benzoic
Oxalic
Sulphuric
Nitric
Tartaric
Mucic
Phosphoric
Citric
Succinic
Fluoric
Arsenic
Lactic
Acetic
Boracic
Hydrocyanic
Fixed alkalies
Ammonia

SULPHURIC ACID.
HYDROCYANIC.[1]

Baryta
Strontia
Potassa
Soda
Lime
Magnesia
Ammonia
Glucine
Yttria
Alumina
Zircon
Metallic oxides

SULPHUROUS ACID.
SUCCINIC.[2]

Baryta
Lime
Potassa
Soda
Strontia
Magnesia
Ammonia
Glucine
Alumina
Zircon
Metallic oxides

PHOSPHORIC ACID.
CARBONIC.[3]

Baryta
Strontia
Lime
Potassa
Soda
Ammonia
Magnesia
Glucine
Alumina
Zircon
Metallic oxides
Silex

PHOSPHOROUS ACID.

Lime
Baryta
Strontia
Potassa
Soda
Ammonia
Glucine
Alumina
Zircon
Metallic oxides

NITRIC ACID.
MURIATIC ACID.[4]

Baryta
Potassa
Soda
Strontia
Lime
Magnesia
Ammonia
Glucine
Alumina
Zircon
Metallic oxides

FLUORIC ACID.
BORACIC ACID.[5]
ARSENIC ACID.[6]
TUNGSTIC ACID.

Lime
Baryta
Strontia
Magnesia
Potassa
Soda
Ammonia
Glucine
Alumina
Zircon
Silex

ACETIC ACID.
LACTIC ACID
SUBERIC ACID.[7]

Baryta
Potassa
Soda

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[1] With the omission of all after ammonia.
[2] Ammonia should come before magnesia: and strontia, glucine, and zircon, be omitted.
[3] Magnesia should stand above ammonia, and alumina and silica be omitted.
[4] Ammonia should stand above magnesia.
[5] Silex should be omitted, and water and alcohol inserted.
[6] Except silex.
[7] With the omission of strontia, metallic oxides, glucine, and zircon.

TABLES OF SIMPLE AFFINITY—*continued.*

Strontia	Soda	CAMPHORIC ACID.	ALCOHOL.
Lime	Ammonia	Lime	Water
Ammonia	Alumina	Potassa	Ether
Magnesia[1]	Metallic oxides	Soda	Volatile oil
Metallic oxides	Water	Baryta	Alkaline sulphurets
Glucine	Alcohol	Ammonia	
Alumina		Alumina	
Zircon		Magnesia	
OXALIC ACID. TARTARIC ACID. CITRIC ACID.[2]	BENZOIC ACID.	FIXED OILS.	SULPHURETTED HYDROGEN
Lime	White oxide of arsenic	Lime	Baryta
Baryta	Potassa	Baryta	Potassa
Strontia	Soda	Potassa	Soda
Magnesia	Ammonia	Soda	Lime
Potassa	Baryta	Magnesia	Ammonia
	Lime	Oxide of mercury	Magnesia
	Magnesia	Metallic oxides	Zircon
	Alumina	Alumina	

No. II.

TABLES *of the Specific Gravities of Substances, which are Articles of the Materia Medica, at a Temperature of* 60° *of Fahrenheit.*

METALS AND INFLAMMABLES.	
Mercury (distilled)	13·568
Sulphuret of mercury	10·000
Bichloride of mercury	5·2
Calomel	7·2
Lead	11·35
Gold	19·2
Silver	10·474
Bismuth	9·83
Copper	8·86
Arsenic	5·8843
Sulphuret of arsenic (red)	3·225
——— (yellow)	5·315
Iron	7·788
Sulphuret of iron	4·513
Tin	7·29
Zinc	6·861 to 7·2
Manganese	6·850
Antimony	6·702
Sulphuret of antimony	4·62
Sodium	0·972
Potassium	0·865
Phosphorus	1·714
Sulphur	1·99
Charcoals	0·223 to 1·526
Bitumens	0·892 to 1·357

SALINE SUBSTANCES.	
Sulphuric acid	1·842
Nitric acid	1·077
Hydrochloric acid	1·192
Acetic acid	1·063
Vinegar	1·0135 to 1·022
Distilled vinegar	1·007 to 1·005
Citric acid	1·130
Benzoic acid	0·667
Arsenious acid	3·7
Potassa (hydrate)	1·7085
Soda (do.)	1·336
Ammonia, liquid	0·936
Lime	2·3
Magnesia	2·3
Baryta	4·00
Alumina	2·000
Sulphate of potassa	2·298
——— soda	2·462
——— magnesia	1·6603

[1] Magnesia should stand above ammonia.

[2] Zircon after alumina.

Alum - - -	1·719
Nitrate of potassa -	1·933
Chloride of sodium -	2·120
Hydrochlorate of ammonia - -	1·45
Chloride of calcium -	1·76
Chloride of barium -	2·8257
Phosphate of soda -	1·338
Acetate of potassa -	2·1—?
Tartrate of potassa -	1·5567
——— and soda	1·757
Bitartrate of potassa -	1·953
Carbonate of potassa -	2·012
——— soda -	1·421
——— ammonia -	0·966
——— lime -	2·7
——— magnesia -	2·56
——— baryta -	4·331
Sub-borate of soda -	1·720

METALLIC SALTS.

Mercury, bichloride of -	5·1398
——— chloride -	7·1758
——— sub-sulphate -	6·444
Copper, sulphate of -	2·1943
——— acetate -	1·779
Iron, sulphate of -	1·880
——— carbonate - -	3·333
——— acetate - -	1·368
Lead, carbonate of -	6·72
——— superacetate -	2·345
Zinc, sulphate of -	1·912

VEGETABLE SUBSTANCES AND PRODUCTIONS.

Cinchona bark - -	0·7840
Logwood - - -	0·9130
Madder root - -	0·7650
Mahogany - -	1·0630
Red saunders - -	1·1280
Sassafras - -	0·4820
Gum-arabic - -	1·355
Hepatic aloes - -	1·3586
Socotrine aloes - -	1·3796
Amber (yellow)	1·065—1·07
Ammoniacum - -	1·2071
Assafœtida - -	1·3275
Benzoin - - -	1·0924
Camphor - -	0·9887
Catechu - -	1·4573
Elemi - - -	1·0682
Euphorbium - -	1·1244
Galbanum - -	1·2120
Galipot - -	1·0819
Gamboge - - -	1·2216
Guaiacum - -	1·2289
Honey - - -	1·45
Myrrh - - -	1·3600
Olibanum - -	1·1732
Opium - - -	1·3359
Opoponax - -	1·6226
Resin (common) -	1·0727
Sagapenum - -	1·2008
Scammony (Aleppo) -	1·2354
——— (Smyrna) -	1·2743
Storax - - -	1·1098
Sugar (refined) - -	1·6060
Tragacanth - -	1·8161
Turpentine - -	9·991
Wax (yellow) - -	0·9648
——— (white) - -	0·9686

FATS AND OILS.

Fat of beef - - -	0·9232
——— mutton - -	0·9235
——— pork - -	0·9368
Tallow - - -	0·9419
Butter - - -	0·9423
Spermaceti - -	0·9433
Oil of linseed - -	0·9403
——— olives - -	0·9153
——— almonds - -	0·9170
Naphtha - -	0·753
Oil of cinnamon -	1·044
——— cloves - -	1·036
——— lavender - -	0·894
——— mint - -	0·8982
——— rosemary - -	0·9057
——— chamomile -	0·8943
——— savine - -	0·9294
——— caraway - -	0·9049
——— aniseed - -	0·9867
——— juniper - -	0·8577
——— turpentine - -	0·8697
——— amber - -	0·8867
Sulphuric ether - -	0·632
Nitric ether - -	0·9088
Alcohol - -	0·794
Proof spirit - -	0·916
Water (distilled) -	1·000

No. III.

RULES *for reducing the Volume of Gases to a Mean Height of the Barometer, and Mean Temperature.*[1]

1. *From the space occupied by any quantity of gas under an observed degree of pressure, to infer what its volume would be under the mean height of the barometer, taking this at 30 inches.*

This is done by the rule of proportion ; for, as the mean height is to the observed height, so is the observed volume to the volume required. For example, if we wish to know what space would be filled under a pressure of 30 inches of mercury, by a quantity of gas, which fills 100 inches, when the barometer is at 29 inches

30 : 29 :: 100 : 96·66.

The 100 inches would, therefore, be reduced to 96·66.

2. *To estimate what would be the volume of a portion of gas, if brought to the temperature of 60° Fahrenheit.*

Divide the whole quantity of gas by 480 ; the quotient will show the amount of its expansion or contraction by each degree of Fahrenheit's thermometer. Multiply this by the number of degrees which the gas exceeds or falls below 60°. If the temperature of the gas be above 60°, subtract, or if below 60°, add the product to the absolute quantity of gas; and the remainder in the first case, or sum in the second, will be the answer. Thus, to find what space 100 cubic inches of gas at 50° would occupy if raised to 60°, divide 100 by 480 ; the quotient 0·208 multiplied by 10 gives 2·08, which added to 100 gives 102·08, the answer required. If the temperature had been 70°, and we had wished to know the volume, which the gas would have occupied at 60°, the same number 2·08 must have been subtracted from 100, and 97·92 would have been the answer.

3. *In some cases it is necessary to make a double correction, or to bring the gas to a mean both of the barometer and thermometer.*

We must then first correct the temperature, and afterwards the pressure. Thus to know what space 100 inches of gas at 70° Fahr., 29 inches barometer, would fill at 60° Fahr., and 30 inches barometer, we first reduce 100 inches, by the second process, to 97·92. Then, by the first

30 : 29 :: 97·92 : 94·63.

Or 100 inches, thus corrected, would be only 94·63.

4. *To ascertain what would be the absolute weight of a given column of gas at a mean temperature, from the known weight of an equal volume at any other temperature.*

First, find by the second process what would be its bulk at a mean temperature; and then say, as the corrected bulk is to the actual weight, so is the observed bulk to the number required. Thus, if we have 100 cubic inches of gas weighing 50 grains at 50° Fahr., if the temperature were raised to 60°, they would expand to 102·08. And

102·08 : 50 :: 100 : 49.

Therefore 100 inches of the same gas at 60° would weigh 49 grains.

5. *To learn the absolute weight of a given volume of gas under a mean pressure, from its known weight under an observed pressure*, say, as the observed pressure is to the mean pressure, so is the observed weight to the corrected weight. For example, having 100 inches of gas which weigh 50 grains under a pressure of 29 inches, to know what 100 inches of the same gas would weigh, the barometer being 30 inches.

29 : 30 :: 59 : 51·72.

Then 100 inches of the same gas, under 30 inches pressure, would weigh 51·72 grains.

6. *In some cases it is necessary to combine the two last calculations.* Thus, if 100 inches of gas at 50° Fahr., and under 29 inches pressure, weigh 50 grains, to find what would be the weight of 100 inches at 60° Fahr., and under 30 inches of the barometer, first correct the temperature, which reduces the weight to 49 grains. Then,

29 : 30 :: 49 : 50·7.

100 inches, therefore, would weigh 50·7 grains.

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[1] Vide *Henry's Elements of Experimental Chymistry*, vol. ii. p. 497.

No. IV.

TABLES *of the Correspondence between Measures of Weight and Capacity : according to the Estimations given by Sir George Shuckburgh Evelyn, in vol.* 88 *of the Phil. Trans., corrected by Mr. Fletcher in the* 4*th Vol. of the Philosophical Journal.*[1]

TABLE I.

For converting Cubic Inches of Water (at 60° Therm. and 29·5 Bar.), into their equivalents in Troy Weight.

Cubic Inch of Water.	*Troy Grains.*	*oz.*	*drachms.*	*grs.*
1 weighs	252·506 =	0	4	12·506
2 *cubic inches* weigh	505·012 =	1	0	25·012
3	757·518 =	1	4	37·518
4	1010·024 =	2	0	50·024
5	1262·530 =	2	5	2·530
6	1515·036 =	3	1	15·036
7	1767·542 =	3	5	27·542
8	2020·048 =	4	1	40·048
9	2272·554 =	4	5	52·554
1728 (1 cubic foot)	———	909	0	10·368

TABLE II.

For converting Troy Grains, Drachms, Ounces, and Pounds of Water into their equivalent Cubic Inches.

Grains.	*Cubic Inch.*	*Drachms.*	*Cubic Inch.*
1 =	·00396	1 =	·237618
2 =	·00792	2 =	·475236
3 =	·01188	3 =	·712854
4 =	·01584	4 =	·950472
5 =	·01980	5 =	1·188090
6 =	·02376	6 =	1·425708
7 =	·02772	7 =	1·663326
8 =	·03168		
9 =	·03564		

Ounces.	*Cubic Inches.*	*Pounds.*	*Cubic Inches.*
1 =	1·900945	1 =	22·81134
2 =	3·801890	2 =	45·62268
3 =	5·702835	3 =	68·43402
4 =	7·603780	4 =	91·24536
5 =	9·504125	5 =	114·05670
6 =	11·405670	6 =	136·86804
7 =	13·306615	7 =	159·67938
8 =	15·207560	8 =	182·49072
9 =	17·108505	9 =	205·30206
10 =	19·009450		
11 =	20·910395		

[1] Not having the Fourth Volume of the Philosophical Journal by us, we have copied these Tables from the Appendix of Aikin's Dictionary.

TABLE III.

For converting Ounces, Drachms, and Grains Troy into Decimals of the Troy Pound.

Grains.	*lbs. Troy.*	*Drachms.*	*lbs. Troy.*	*Oz.*	*lbs. Troy.*
1 =	·00017361$\dot{1}$	1 =	·010416$\dot{6}$	1 =	·083$\dot{3}$
2 =	·00034722$\dot{2}$	2 =	·020833$\dot{3}$	2 =	·166$\dot{6}$
3 =	·00052083$\dot{3}$	3 =	·031250$\dot{0}$	3 =	·250$\dot{0}$
4 =	·00069444$\dot{4}$	4 =	·041666$\dot{6}$	4 =	·333$\dot{3}$
5 =	·00086805$\dot{5}$	5 =	·052083$\dot{3}$	5 =	·416$\dot{6}$
6 =	·00104166$\dot{6}$	6 =	·062500$\dot{0}$	6 =	·500$\dot{0}$
7 =	·00121527$\dot{7}$	7 =	·072966$\dot{6}$	7 =	·583$\dot{3}$
8 =	·00138888$\dot{8}$			8 =	·666$\dot{6}$
9 =	·00156250$\dot{0}$			9 =	·750$\dot{0}$
				10 =	·833$\dot{3}$
				11 =	·916$\dot{6}$

TABLE IV.

For converting Decimals of the Troy Pound into Troy Ounces, Drachms, and Grains.

lbs.	*oz.*	*dr.*	*grs.*	*lbs.*	*oz.*	*dr.*	*grs.*	*lbs.*	*grs.*
·1 =	1 :	1 :	36	·01 =	0 :	0 :	57·6	·001 =	5·76
·2 =	2 :	3 :	12	·02 =	0 :	1 :	55·2	·002 =	11·32
·3 =	3 :	4 :	48	·03 =	0 :	2 :	52·8	·003 =	17·28
·4 =	4 :	6 :	24	·04 =	0 :	3 :	50·4	·004 =	23·04
·5 =	6 :	0 :	0	·05 =	0 :	4 :	48·0	·005 =	28·80
·6 =	7 :	1 :	36	·06 =	0 :	5 :	45·6	·006 =	34·56
·7 =	8 :	3 :	12	·07 =	0 :	6 :	43·2	·007 =	40·32
·8 =	9 :	4 :	48	·08 =	0 :	7 :	40·8	·008 =	46·08
·9 =	10 :	6 :	24	·09 =	0 :	8 :	38·4	·009 =	51·08

No. V.

TABLES *showing the Correspondence between the new French and the English Weights and Measures.*

I. MEASURES OF LENGTH.

The metre being at 32°, and the foot at 62°.

		English Inches.		*Miles.*	*fur.*	*English yds.*	*ft.*	*in.*
Millimetre	=	·03937						
Centimetre	=	·39371						
Decimetre	=	3·93710						
Metre	=	39·37100	=	0	0	1	0	3·7
Decametre	=	393·71000	=	0	0	10	2	9·7
Hecatometre	=	3937·10000	=	0	0	109	1	1
Kilometre	=	39371·00000	=	0	4	213	1	10·2
Myriametre	=	393710·00000	=	6	1	156	0	6

II. MEASURES OF CAPACITY.

		Cubic Inches.		Apothecaries' Measure.
Millitre	=	·0610	=	16·3 minims.
Centilitre	=	·6103	=	2·705 fluid drachms.
Decilitre	=	6·1028	=	3·381 fluid ounces.
Litre	=	61·028	=	1·7608 pints.
Decalitre	=	610·028	=	2·201 imp. gals.
Hectolitre	=	6102·8	=	22·01 do.
Kilolitre	=	61028·0	=	27·51 imp. bush.
Myrialitre	=	610280·0	=	34·39 imp. quarters.

III. MEASURES OF WEIGHT.

		English Troy Grains.		Imper. Weight.
Milligramme	=	·0154		
Centigramme	=	·1543		
Decigramme	=	1·5434		
Gramme	=	15·434		
Decagramme	=	154·3402	=	5·65 drachms.
Hecatogramme	=	1543·4023	=	3·527 ounces.
Kilogramme	=	15434·0234	=	2·205 lbs.
Myriagramme	=	154340·2344	=	22·047 lbs.

Gram.		Troy grs.	Decagram.		Troy dr. : grs.	Hectogram.		Troy oz.
1	=	15·444	1	=	2 : 34·44	1	=	3·2175
2	=	30·888	2	=	5 : 8·88	2	=	6·4350
3	=	46·332	3	=	7 : 43·32	3	=	9·6525
4	=	61·776	4	=	10 : 17·76	4	=	12·8700
5	=	77·220	5	=	12 : 52·20	5	=	16·0875
6	=	92·664	6	=	15 : 26·64	6	=	19·3050
7	=	108·108	7	=	18 : 1·08	7	=	22·5295
8	=	123·552	8	=	20 : 35·52	8	=	25·7400
9	=	138·996	9	=	23 : 9·96	9	=	28·9575

IV. CONTINENTAL MEDICINAL WEIGHTS IN TROY GRAINS.[1]

	Pounds.	Ounces.	Drachms.	Scruples consisting of 24 med. grs.	Scruples consisting of 20 med. grs.	Grs.
French	5670·5	470·50	59·10	19·7	—	0·820
Spanish	5326·3	443·49	55·14	18·47	—	0·769
Tuscan	5240·3	436·67	54·58	18·19	—	0·758
Roman	5235·0	436·25	54·58	18·17	—	0·757
Austrian	6495·1	541·25	67·65	—	22·5	1·127
German	5524·8	460·40	57·55	—	19·18	0·960
Russian	5524·8	460·40	57·55	—	19·18	0·960
Prussian	5415·1	451·26	56·40	—	18·80	0·940
Dutch	5695·8	474·64	59·33	—	19·78	0·988
Belgian	5695·8	474·64	59·33	—	19·78	0·988
Swedish	5500·2	458·34	57·29	—	19·09	0·954
Piedmontese	4744·7	395·39	49·45	—	16·48	0·824
Venetian	4661·4	388·45	48·55	—	16·18	0·809

[1] Christison's *Dispensatory*.

No. VI.

TABLES *showing the Correspondence of English Weights and Measures with those of Holland, Sweden, and Germany.*

The English or Imperial Gallon contains 277·274 cubic inches = 10 lbs. = 70,000 grs. Troy.

I. DUTCH.

1 lb. Dutch = 1 lb. 3 oz. 16 dwt. 7 grs. Troy.
$787\frac{1}{2}$ lbs. Dutch = 1038 lbs. Troy.

II. SWEDISH.

1 kanne of water Swedish = 48088·719444 grs. Troy, in weight; and 189·9413 English cubic inches.
1 lb. Swedish = 6556 grs. Troy.

III. GERMAN.

74 lbs. German Apothecaries' weight = 74 lbs. Troy.
1 oz. Nuremberg medic. weight = 7 dr. 2 dwt. 9 grs. Troy.
1 mark Cologne = 7 oz. 2 dwt. 4 grs. Troy.

No. VII.

TABLE *of the Solubility of Pharmaceutical Salts in* 100 *Parts Water, at*

ACIDS.	60°	212°
Arsenious	1·25	6
Benzoic	0·208	4·17
Boracic	2·8	8
Citric (*Vauquelin*)	133	200
Gallic	8·3	66
Oxalic	50	100
Phosphoric	20	much more.
Tartaric	very soluble.	

SALIFIABLE BASES.	60°	212°
Potassa (pure)	41	56·5
Soda (pure)	more soluble than Potassa.	
Baryta (crystallized)	57	watery fusion.
Strontia (crystallized)	19·2	50
Lime	0·1287	0·0789
Magnesia (*Dr. Fyfe*)	0·0194	0·00277

SALTS.	60°	212°
Alum, potash (*Dr. T. Thomson*)	14·79	133
—— soda (*ditto*)	327·6	
Ammonia, acetate	very soluble.	
——— carbonate		
——— bicarbonate	decomposed.	
——— sesquicarbonate	50	100
——— hydro-chlorate	33	100
——— phosphate	15	25
——— sulphate	50	100
Potassio-tartrate of antimony	6·6	33
Barium (chloride)	34	59
Baryta, acetate	very soluble.	
——— nitrate	8	25
Copper, acetate	very soluble.	
——— sulphate	25	50
Lead, acetate	25	+
Iron, sulphate	50	130
Calcium, chloride	400	+
Magnesia, acetate	very soluble.	
——— carbonate	0·04	0·0111
——— sulphate	100	644
Mercury, bichloride	5	33
Potassum iodide	very soluble.	
Potassa, acetate	100	
——— carbonate	100+	
——— bicarbonate	25	decomposed.
——— ferrocyanate	33	100
——— hydrocyanate	very soluble.	
——— iodate	7·5	
——— sulphate	6·25	20
——— bisulphate	50	100+
——— bitartrate	1·6	3·3
——— tartrate	25	
Silver, nitrate	100	
Sodium, chloride	35·42	40
Soda, carbonate	50	100+
—— bicarbonate	much less.	decomposed.
—— bi-borate (*borax*)	5	16·8
—— ——— with bitartrate of potassa	20	+
—— phosphate	25	50
—— sulphate	37	125
—— bisulphate	50	
Zinc, sulphate	40	+

No. VIII.

TABLE *in which the Specific Gravity is compared with the Degrees of Baumé's Hydrometer.*

For Fluids lighter than Water.

Degree of Areometer.	Specific Gravity.			Degree of Areometer.	Specific Gravity.		
	By Baumé.	In Pharm. Batav.	By Beck.		By Baumé.	In Pharm. Batav.	By Beck.
0		1000	1·0000	32	0·8638	819	0·8415
1		993	0 9941	33	0·8584	814	0·8374
2		987	0·9883	34	0·8531	810	0·8333
3		980	0·9826	35	0·8479	805	0·8292
4		974	0·9770	36	0·8428	800	0·8252
5		967	0·9714	37	0·8378	796	0·8212
6		961	0·9659	38	0·8329	792	0·8173
7		954	0·9604	39	0·8281	787	0·8133
8		948	0·9550	40	0·8233	782	0·8095
9		941	0·9497	41	0·8186	778	0·8056
10	1·0000	935	0·9444	42	0·8139	774	0·8018
11	0·9930	929	0·9392	43	0·8093	770	0·7981
12	0·9861	923	0·9340	44	0·8047	766	0·7943
13	0·9792	917	0·9289	45	0·8001	762	0·7906
14	0·9724	911	0·9239	46	0·7956	758	
15	0·9657	906	0·9189	47	0·7911	754	
16	0·9591	900	0·9139	48	0·7866	750	
17	0·9526	895	0·9090	49	0·7821	746	
18	0·9462	889	0·9042	50	0·7777	742	
19	0·9399	884	0·8994	51	0·7733		
20	0·9336	878	0·8947	52	0·7689		
21	0·9274	873	0·8900	53	0·7646		
22	0·9212	868	0·8854	54	0·7603		
23	0·9151	863	0·8808	55	0·7560		
24	0·9091	858	0·8762	56	0·7518		
25	0·9032	853	0·8717	57	0·7476	712?	
26	0·8974	847	0·8673	58	0·7435		
27	0·8917	842	0·8629	59	0·7394		
28	0·8860	837	0·8585	60	0·7354		
29	0·8804	832	0·8542	61	0·7314		
30	0·8748	828	0·8500	62	0·7251		
31	0·8693	823	0·8457				

No. IX.

COMPARATIVE SCALE *of Baumé's Hydrometer with Sp. Gr.*

For Fluids heavier than Water.

Degree of Areometer.	Specific Gravity.			Degree of Areometer.	Specific Gravity.		
	By Baumé.	In Pharm. Batav.	By Beck.		By Baumé.	In Pharm. Batav.	By Beck.
0	1·0000	1000	1·0000	41	1·3947	1398	1·3178
1	1·0070	1007	1 0059	42	1·4082	1412	1·3281
2	1·0141	1014	1·0119	43	1·4219	1426	1·3386
3	1·0213	1022	1·0180	44	1·4359	1440	1·3492
4	1·0286	1029	1·0241	45	1·4501	1454	1·3600
5	1·0360	1036	1·0303	46	1·4645	1470	1·3710
6	1·0435	1044	1·0366	47	1·4792	1485	1·3821
7	1·0511	1052	1·0429	48	1·4942	1501	1·3934
8	1·0588	1060	1·0494	49	1·5096	1516	1·4050
9	1·0666	1067	1·0559	50	1·5253	1532	1·4167
10	1·0745	1075	1·0625	51	1·5413	1549	1·4286
11	1·0825	1083	1·0692	52	1·5576	1566	1·4407
12	1·0906	1091	1·0759	53	1·5742	1583	1·4530
13	1·0988	1100	1·0828	54	1·5912	1601	1·4659
14	1·1071	1108	1·0897	55	1·6086	1618	1·4783
15	1·1155	1116	1·0968	56	1·6264	1637	1·4912
16	1·1240	1125	1·1039	57	1·6446	1656	1·5044
17	1·1326	1134	1·1111	58	1·6632	1676	1·5179
18	1·1414	1143	1·1184	59	1·6823	1695	1·5315
19	1·1504	1152	1·1258	60	1·7019	1715	1·5454
20	1·1596	1161	1·1333	61	1·7220	1736	1·5596
21	1·1690	1171	1·1409	62	1·7427	1758	1·5741
22	1·1785	1180	1.1486	63	1·7640	1779	1·5888
23	1·1882	1190	1·1565	64	1·7858	1801	1·6038
24	1·1981	1199	1·1644	65	1·8082	1823	1·6190
25	1·2082	1210	1·1724	66	1·8312	1847	1·6346
26	1·2184	1221	1·1806	67	1·8548	1872	1·6505
27	1·2288	1231	1·1888	68	1·8790	1897	1·6667
28	1·2394	1242	1·1972	69	1·9038	1921	1·6832
29	1·2502	1252	1·2057	70	1·9291	1946	1·7000
30	1·2612	1261	1·2143	71	1·9548	1974	1·7172
31	1·2724	1275	1·2230	72	1·9809	2020	1·7347
32	1·2831	1286	1·2319	73	2·0073	2031	1·7526
33	1·2954	1298	1·2409	74	2·0340	2054	1·7708
34	1·3072	1309	1·2500	75	2·0610	2087	1·7895
35	1·3190	1321	1·2593	76		2116	1·8085
36	1·3311	1334	1·2687	77			1·8280
37	1·3434	1346	1·2782	78			1·8478
38	1·3559	1359	1·2879	79			1·8681
39	1·3686	1372	1·2997	80			1·8889
40	1·3815	1384	1·3077				

No. X.

Terms employed in Prescriptions.

Congius,	c, a gallon.	*Libra,*	℔, a pound.
Octarius,	o, a pint.	*Uncia,*	℥j., an ounce.
Fluid uncia,	f℥j., $\frac{1}{20}$ of a pint.	*Drachma,*	ʒj., a drachm.
Fluid drachma,	fʒj., $\frac{1}{160}$ of a pint.	*Scrupulus,*	℈j., a scruple.
Minimum,	♏, $\frac{1}{9600}$ of a pint.	*Granum,*	gr., a grain.

Cyathus, a wineglass, = f℥jss. of any aqueous infusion, decoction, or mixture.

Poculum, a teacup, = f℥iv.

Cochleare majus, a table spoonful, = fʒiv. of aqueous fluids = fʒiij. of alcoholic.

Cochleare minimum, a tea-spoonful, = fʒ ss. of aqueous fluids: = ♏xx. of alcoholic: = ʒj. to ʒij. of conserves: = ℈ss. to ℈j. of light powders: = ʒss. to ℈ij. of heavy, not metallic: = ʒj. to ℈iv. of metallic.

Manipulus, a handful.

Pugillus, a pinch, lifted between the thumb and the fore and second finger.

No. XI.

TABLES OF FREEZING MIXTURES.

The following Tables were drawn up by Mr. Walker from actual experiments. They show the degree of cold, or the reduction of temperature, which may be obtained by the different combinations mentioned in the first column.

TABLE I.

FRIGORIFIC MIXTURES—*WITHOUT ICE.*

Mixtures.	Parts.	Thermometer sinks.	Degree of cold produced.
Muriate of ammonia - Nitrate of potassa - Water - - -	5 5 16	From +50° to +10°	40
Muriate of ammonia - Nitrate of potassa - - Sulphate of soda - - Water - - -	5 5 8 16	From +50° to +4°	46
Nitrate of ammonia - Water - - -	1 1	From +50° to +4°	46
Nitrate of ammonia - Ca bonate of soda - Water - - -	1 1 1	From +50° to −7°	57
Sulphate of soda - - Diluted nitric acid -	3 2	From +50° to −30°	80
Sulphate of soda - - Muriate of ammonia - Nitrate of potassa - - Diluted nitric acid -	6 4 2 4	From +50° to −10°	60
Sulphate of soda - - Nitrate of ammonia - Diluted nitric acid -	6 5 4	From +50° to −14°	64
Phosphate of soda - Diluted nitric acid -	9 4	From +50° to −12°	62
Phosphate of soda - - Nitrate of ammonia - Diluted nitric acid -	9 6 4	From +50° to −21°	71
Sulphate of soda - - - - Muriatic acid - -	8 5	From +50° to −0°	50
Sulphate of soda - - Diluted sulphuric acid		From + 50° to −3°	53

N. B. If the materials are mixed at a warmer temperature than that expressed in the ta'le, the effect will be proportiona'ly greater; thus, if the most powerful of these mixtures be made when the air is +85°, it will sink the thermometer to +2°.

TABLE II.

FRIGORIFIC MIXTURES — *WITH ICE.*

<table>
<tr><th>Mixtures.</th><th>Parts.</th><th colspan="2">Thermometer sinks.</th><th>Degree of cold produced.</th></tr>
<tr><td>Snow, or pounded ice -
Muriate of soda - -</td><td>2
1</td><td rowspan="4">From any temperature</td><td>to $-5°$</td><td>*</td></tr>
<tr><td>Snow, or pounded ice -
Muriate of soda - -
Muriate of ammonia -</td><td>5
2
1</td><td>to $-12°$</td><td>*</td></tr>
<tr><td>Snow, or pounded ice -
Muriate of soda - -
Muriate of ammonia -
Nitrate of potassa -</td><td>24
10
5
5</td><td>to $-18°$</td><td>*</td></tr>
<tr><td>Snow, or pounded ice -
Muriate of soda - -
Nitrate of ammonia -</td><td>12
5
5</td><td>to $-25°$</td><td></td></tr>
<tr><td>Snow - - -
Diluted sulph. acid -</td><td>3
2</td><td colspan="2">From $+32°$ to $-23°$</td><td>55</td></tr>
<tr><td>Snow - - -
Muriatic acid - -</td><td>8
5</td><td colspan="2">From $+32°$ to $-27°$</td><td>59</td></tr>
<tr><td>Snow - - -
Diluted nitric acid -</td><td>7
4</td><td colspan="2">From $+32°$ to $-30°$</td><td>62</td></tr>
<tr><td>Snow - - - -
Muriate of lime - -</td><td>4
5</td><td colspan="2">From $+32°$ to $-4°$</td><td>72</td></tr>
<tr><td>Snow - - - -
Cryst. muriate of lime -</td><td>2
3</td><td colspan="2">From $+32°$ to $-50°$</td><td>82</td></tr>
<tr><td>Snow - - -
Potassa - - -</td><td>3
4</td><td colspan="2">From $+32°$ to $-51°$</td><td>83</td></tr>
</table>

N. B. The reason for the omission in the last column of this table, is the thermometer sinking in the mixtures to the degree mentioned in the preceding column, and never lower, whatever may be the temperature of the materials at mixing.

TABLE III.

COMBINATION OF FRIGORIFIC MIXTURES.

Mixtures.	Parts.	Thermometer sinks.	Degree of cold produced.
Phosphate of soda - - Nitrate of ammonia - Diluted nitric acid -	5 3 4	From 0 to -34°	34
Phosphate of soda - - Nitrate of ammonia - Diluted mixed acids -	3 2 4	From -34° to -50°	16
Snow - - - - - Diluted sulphuric acid - *Or*, Diluted nitric acid -	8 3 3	From -10° to -56°	46
Snow - - - - - Diluted nitric acid -	3 2	From -0° to -46°	46
Snow - - - - - Diluted sulphuric acid -	1 1	From -20° to -60°	40
Snow - - - Muriate of lime - -	3 4	From $+20^{\circ}$ to -48°	68
Snow - - - - Muriate of lime - -	3 4	From $+10^{\circ}$ to -54°	64
Snow - - - - Muriate of lime - -	2 3	From $+15^{\circ}$ to -68°	53
Snow - - - Cryst. muriate of lime -	1 2	From 0° to -66°	66
Snow - - - - Cryst. muriate of lime -	1 3	From -40° to -73°	33
Snow - - - Diluted sulphuric acid -	1 10	From -68° to -91°	23

N. B. The salts should be as recently crystallized as possible; they should be finely pulverized and cooled to 32°, or to the first point indicated in the table, by mixtures taken from either of the preceding tables, previous to mixing them. The vessels employed should be thin, and the mixtures made as rapidly as possible.

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THE END.

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